

*The Honors Program's  
Center for Undergraduate Research Opportunities*



*CURO*

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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**Symposium Chair:** Dr. Pamela Kleiber

**Editor:** Rebecca Ritter

**Cover and poster design:** Rebecca Ritter

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Faith Ploener, Photography Major, Lamar Dodd School of Art  
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**Proofread by:** Pamela Bonner, Joy Harden, Peter Horanyi, Dr. Pamela Kleiber,  
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Center for Undergraduate Research Opportunities

*CURO*

# 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](http://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](mailto: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](mailto:pkleiber@uga.edu), (706) 542-0530.

# ‡ CURO Symposium 2005 At A Glance ‡

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*Monday, April 11<sup>th</sup>, 2005*

**Concurrent Oral Sessions (three 50 min. sessions)**  
Tate Student Center, Conference Rooms 138, 139, 140, 143, 144

**12:20 -3:20 p.m.**  
\*sessions acc. to MWF class schedule

**Welcome and Opening Session**  
Tate Student Center, Georgia Hall A

**4:00 p.m.**  
**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**  
Managing Editor, *Journal for Undergraduate Research Opportunities (JURO)*

**Jeremy Johnson**

**Keynote Address: “Transposable Elements:  
Teaching Old Genomes New Tricks”**

**Dr. Sue Wessler**  
Distinguished Research Professor of Plant Biology

**Reception and Poster Presentations**  
Tate Student Center, Georgia Hall

**5:00 p.m. – 7:00 p.m.**

**Art Gallery Opening and Artist Talks**  
Tate Student Center Gallery

**7:00 p.m. – 8:30 p.m.**  
**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**  
Tate Student Center, Reception Hall

**7:00 p.m. – 8:00 p.m.**  
**Melissa Cabinian and Melvin Hines, Jr.**  
CURO Alumni and Senior Peer Advisors  
**Ms. Catherine Packer**  
Graduate Assistant

*Tuesday, April 12<sup>th</sup>, 2005*

**Concurrent Oral Sessions (three 75 min. sessions)**  
Tate Student Center, Conference Rooms 138, 139, 140, 143, 144

**9:30 a.m. – 1:45 p.m.**  
\*sessions acc. to TR class schedule

**Vendor Market**  
Tate Student Center, Georgia Hall

**10:00 a.m. – 2:00 p.m.**

**NIF Research Project**  
Tate Student Center, Conference Room 145

**11:30 a.m. – 1:00 p.m.**  
Jeremy Johnson

**Performing Arts Presentations**  
Tate Student Center, Georgia Hall

**2:00 p.m. – 4:15 p.m.**

**JURO: Meet the Editors**  
Tate Student Center, Reception Hall

**2:30 p.m. – 4:00 p.m.**

**Closing Ceremony and Awards**  
Tate Student Center, Georgia Hall

**4:30 p.m. – 5:30 p.m.**  
**Dr. Arnett C. Mace, Jr.**  
Senior Vice President for Academic Affairs and Provost  
**Professor Jere Morehead**  
Vice Provost for Academic Affairs

# ∞ *CURO Symposium 2005 Program* ∞

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**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**

<b>Room 138</b>	<b>Shana Strickland</b>	The Socialization of Anger among Maltreating and Nonmaltreating Mothers
	Faculty Mentor	Dr. Kimberly Shipman, Department of Psychology, University of Georgia
	<b>Wendy Ballew, Ann Howell, Andrew Anderson</b>	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
	<b>Christopher Stokes</b>	Child Attentional Control in the Classroom Milieu
	Faculty Mentor	Dr. Randy Kamphaus, Department of Educational Psychology, University of Georgia
<b>Room 140</b>	<b>Lauren Dominick</b>	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
	<b>Erika Vinson</b>	Arts Integration in School Curriculum as a Motivator for Student Success
	Faculty Mentor	Dr. Richard Siegesmund, Art Education, University of Georgia
	<b>Jeremy Johnson</b>	<i>The Journal for Undergraduate Research Opportunities: Building an Undergraduate E-journal for Research in the Arts and the Humanities</i>
	Faculty Mentor	Dr. Pamela Kleiber, Center for Undergraduate Research Opportunities, Honors Program, University of Georgia
<b>Room 143</b>	<b>Benjamin Cannon</b>	Identification of RNA Binding Proteins' Role in Gene Regulation in <i>T. cruzi</i>
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia
	<b>Kate Connell</b>	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
	<b>Edmund Fomunung</b>	Production of Antibodies to Erythrocyte Invasion Proteins of <i>Plasmodium falciparum</i> and Their Use to Investigate Erythrocyte Invasion

## ❧ *CURO Symposium 2005 Program* ❧

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	Faculty Mentor	Dr. David Peterson, Department of Medical Microbiology and Parasitology, University of Georgia
<b>Room 144</b>	<b>Kevin Patrick</b>	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
	<b>Rafael Young</b>	Civil Rights Figures Appearing in the Multicultural Archive of Georgia
	Faculty Mentor	Dr. Timothy Powell, Department of English, University of Georgia
	<b>Jora Vaso</b>	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**

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

## ∞ *CURO Symposium 2005 Program* ∞

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<b>Room 140</b>	<b>Amanda Dempsey</b>	Microarray and qRT-PCR Analysis of Gene Expression in CD8+ T Cells from <i>T. cruzi</i> Infected Mice
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia
	<b>Nicole Warren</b>	Glycopeptide Isolation and Glycosylation Site Identification: A Standardized Procedure
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry, University of Georgia
	<b>Fei Yang</b>	Regulation of Branched-Chain Amino Acid Catabolism in <i>Streptomyces coelicolor</i> : Applications for Metabolic Engineering of Polyketide Antibiotic Biosynthesis
	Faculty Mentor	Dr. Janet Westpheling, Department of Genetics, University of Georgia
<b>Room 143</b>	<b>Megan Leroy</b>	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
	<b>Gene Kim</b>	"Comprehensive Responsibility" and Economic Growth
	Faculty Mentor	Dr. Santanu Chatterjee, Department of Economics, University of Georgia
	<b>Grace Anglin</b>	An Artistic Representation of the Post-September 11th Islamic Community
	Faculty Mentor	Prof. Laleh Mehran, Digital Media, School of Art, University of Georgia
<b>Room 144</b>	<b>Charlie Pitts, Jr.</b>	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
	<b>Natalia Nicholls and Erendira Casas</b>	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
	<b>Mary Gassama</b>	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

<b>Room 138</b>	<b>David M. Smith</b>	Samuel Beckett and the Antinomies of Author and Audience
	Faculty Mentor	Dr. Adam Parkes, Department of English, University of Georgia
	<b>Leslie Wolcott</b>	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

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

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**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

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

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<b>Anjan Deka</b>	Establishing Mammalian Cell Lines that Modulate O-linked N-Acetylglucosamine, 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
<b>John DuVal</b>	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
<b>Dustin Dyer</b>	Laplace Force During Wetting of Vertically Aligned Nanorod Array
Faculty Mentor	Dr. Guigen Zhang, Department of Biological and Agricultural Engineering, University of Georgia
<b>Tiffany Gartrell</b>	The Substrate Specificity of Rce1p
Faculty Mentor	Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia
<b>Christopher Hale</b>	Adolescent Vulnerability to Nicotine Addiction: A Biological Basis
Faculty Mentor	Dr. Thomas F. Murray, Department of Physiology and Pharmacology, University of Georgia
<b>Phillip Benson Ham III</b>	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
<b>Matthew Hastings</b>	Implications of Unique Mineral Assemblages Associated With Subterranean Coal Fires
Faculty Mentor	Dr. Paul A. Schroeder, Department of Geology, University of Georgia
<b>Catherine Hudson</b>	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
<b>Ashley Jackson, Shauncre Mitchell, Nikkitress Nelson</b>	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

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

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<b>Jonathan McWhorter</b> Faculty Mentor	Phenotypic Changes in Dendritic Cell and T lymphocyte Subpopulations of Mice Infected with <i>Schistosoma mansoni</i> or Exposed to <i>S. mansoni</i> Eggs Dr. Daniel Colley, Department of Microbiology, University of Georgia
<b>Amulya Nagarur</b> Faculty Mentor	Functional Analysis of Yeast Ax11, Ste23, and IDE Mutants Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia
<b>Natalie Nicholls and Erendira Casas</b> Faculty Mentor	What is the True Cost per Minute When Using Prepaid Telephone Calling Cards? Dr. Julia Marlowe, Department of Housing and Consumer Economics, University of Georgia
<b>Matthew Nicholson</b> Faculty Mentor	Detecting RSV Virus by Quartz Crystal Microbalance Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia
<b>Tatyana Nienow</b> Faculty Mentor	A Novel Assay for Insulin Degrading Enzyme and it Yeast Orthologs Ste23p and Ax11p Are Recently-Discovered Metalloproteases Found in the Yeast Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia
<b>William Parker</b> Faculty Mentor	Creation of a Novel Ribonuclease T1 Gene for Protein Folding Studies Dr. Marly Eidsness, Department of Chemistry, University of Georgia
<b>Gehres Paschal</b> Faculty Mentor	Constitutively Active Lutropin Receptor Mutants Associated with Familial Male-Limited Precocious Puberty Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia
<b>Karen Petree</b> Faculty Mentor	How African Americans Think about the Links Between Disease and Race Dr. Celeste Condit, Department of Speech Communication, University of Georgia
<b>Matt Rudy</b> Faculty Mentor	Cloning and Expression of a Trigger Factor Variant for Protein Folding Studies Dr. Marly Eidsness, Department of Chemistry, University of Georgia
<b>Amy Sexauer</b> Faculty Mentor	<i>In Situ</i> Hybridization Detection of <i>Babesia microti</i> in Experimentally Infected Hamster Tissues Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia

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<b>Adam Singer</b>	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
<b>Matthew J. Stewart</b>	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
<b>Adam Stroupe</b>	Drug and Nutrient Trafficking in the Human Pathogen <i>Cryptosporidium parvum</i>
Faculty Mentor	Dr. Boris Striepen, Department of Cellular Biology, University of Georgia
<b>Teerawit Supakorndej</b>	Recruitment of Human Telomerase RNA to the Telomeres of Human Cancer Cells
Faculty Mentor	Dr. Michael Terns, Department of Genetics, University of Georgia
<b>John Henry Theiss</b>	Isolation of Mutants of <i>Arabidopsis thaliana</i> 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
<b>Tendoh Timoh</b>	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
<b>Erika Vinson</b>	Arts Integration in School Curriculum as a Motivator for Student Success
Faculty Mentor	Dr. Richard Siegesmund, Art Education, University of Georgia
<b>Nicole Warren</b>	Glycopeptide Isolation and Glycosylation Site Identification: A Standardized Procedure
Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry and Molecular Biology, University of Georgia
<b>Alyson Weber</b>	Creation of an <i>in vitro</i> Transcription System for <i>Mycobacterium tuberculosis</i>
Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases, University of Georgia
<b>Matthew Weiss</b>	Assessing Correlations between Elite Media Coverage and Movement in Public Opinion Polls During Presidential Elections

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Faculty Mentor Dr. Audrey Haynes, Department of Political Science, University of Georgia

**Stephanie Yarnell**  
Faculty Mentor Analysis of the Interactions between Chondroitins and Pectins  
Dr. Carl Bergmann, Complex Carbohydrate Research Center,  
University of Georgia

**Rafael R. Young**  
Faculty Mentor Civil Rights Figures Appearing in the Multicultural Archive of Georgia  
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**  
Faculty Mentors Sculpture  
Dr. Dana Bultman, Department of Romance Languages,  
University of Georgia  
Professor Judith McWillie, Department of Sculpture,  
University of Georgia

**Jessica Horwitz**  
Faculty Mentor Photography  
Ms. Robin Dana, Department of Photography,  
University of Georgia

**Adrienne Lynch**  
Faculty Mentor Ceramics  
Professor Ted Saupe, Department of Ceramics,  
University of Georgia

**Faith Ploener**  
Faculty Mentor Photography  
Professor Ben Reynolds, Department of Photography,  
University of Georgia

**Richard Brandon Puett**  
Faculty Mentor Painting  
Professor Joseph Norman, Department of Drawing and Painting,  
University of Georgia

**Richard T. Scott**  
Faculty Mentor Painting  
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

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**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**

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

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Faculty Mentor	<b>Beau Bryan</b>	Dr. Lance Wells, Department of Biochemistry and Molecular Biology, University of Georgia Cadherin-Mediated Cell-Cell Adhesion Regulated By GnT-V Expression
Faculty Mentor	<b>Erika Lentini and Elizabeth Kantor</b>	Dr. Michael Pierce, Department of Biochemistry and Molecular Biology, University of Georgia Serogrouping and Serotyping of <i>Salmonella</i> using PCR
Faculty Mentor	<b>Douglas Jackson</b>	Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia 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
<b>Room 143</b>	<b>Amy Sexauer</b>	In Situ Hybridization Detection of <i>Babesia microti</i> in Experimentally Infected Hamster Tissues
Faculty Mentor	<b>Disha Chhabra</b>	Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia Creating Expressed Sequence Tags of Human Embryonic Stem Cells
Faculty Mentor	<b>Matthew Crim</b>	Dr. Lee Pratt, Department of Plant Biology, University of Georgia Role of Interleukin-7 Receptor in the Maintenance of Antigen-Specific CD8+ Memory T Lymphocytes in Experimental <i>Trypanosoma cruzi</i> 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

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

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

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

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

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	Faculty Mentor	Dr. David Kamerschen, Department of Economics, University of Georgia
<b>Room 143</b>	<b>Katherine Vyborny</b>	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
	<b>Sara Barnhart</b>	The Complex Nature of Helping: Altruism vs. the Struggle for Global Supremacy
	Faculty Mentor	Dr. Amy Ross, Department of Geography, University of Georgia
	<b>Akrom Khaydarov</b>	U.S. Foreign Policy towards Central Asia
	Faculty Mentor	Dr. Gary Bertsch, Center for International Trade and Security, University of Georgia
	<b>Ivy Le</b>	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
<b>Room 144</b>	<b>Clayton R. Griffith</b>	The Effect of the North American Beaver ( <i>Castor Canadensis</i> ) 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
	<b>Andrew Leidner</b>	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

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

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

Tate Student Center, Georgia Hall

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

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**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 Excellence in Undergraduate Research Mentoring Award ∞*

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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

*∞ The Excellence in Undergraduate Research Mentoring Award ∞*

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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* ❧

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### *Graduate Student Reviewers for CURO Symposium 2005*

Pamela Bonner	Microbiology
Amber Brueggemann	Education
Sarah Cooley	Marine Sciences
Patrick Curtis	Microbiology
Geneva Demars	Biochemistry and Molecular Biology
Obidimma Ezezika	Microbiology
Peter Horanyi	Biochemistry and Molecular Biology
Erinn Howard	Microbiology
Joy Harden	Counseling Psychology
Justin Ingels	Chemistry
Jeff Lake	Plant Biology
Catherine Packer	Counseling Psychology
Greta Polites	Management Information Systems
Jodi Wheeler-Toppen	Science Education

### *CURO Advisory Board*

Dr. Joachim Berkner	Noramco, Inc.
Dr. Gary Bertsch	Director, School of Public and International Affairs
Dr. Betty Jean Craige	Director, Center for Humanities and Arts
Dr. Margaret Cramer	Physician, University Health Center
Dr. Art Dunning	Vice President for Public Service and Outreach
Dr. Stuart Feldman	Associate Director, Biomedical and Health Sciences Institute
Dr. Freda Scott Giles	Associate Professor, Theatre and Film Studies
Dr. Gordhan Patel	Vice President for Research, Executive Director of University of Georgia Research Foundation
Dr. J. David Puett	Department Head, Biochemistry and Molecular Biology
Dr. Fausto Sarmiento	Director, Office of International Education
Dr. Steven Stice	Professor, Animal and Dairy Science
Dr. Katharina Wilson	Professor, Comparative Literature
Melissa Cabinian	Undergraduate
Douglas Jackson	Undergraduate
Leslie Wolcott	Undergraduate

### *Ex Officio*

Dr. David S. Williams	Director of the Honors Program, Foundation Fellows, and CURO
Dr. Pamela B. Kleiber	Associate Director, Honors Program and CURO Coordinator

### *Reviewers for Best Paper Awards*

Dr. Alison Alexander	Telecommunications
Dr. Richard D. Andreatta	Communication Sciences and Disorders
Dr. Bill Barstow	Biological Sciences
Dr. E.M. Beck	Sociology
Dr. Brian T. Forschler	Entomology
Dr. Steve Elliott-Gower	Honors Program and Foundation Fellows
Dr. Jaroslava Halper	Veterinary Medicine
Dr. Margaret Holt	Kettering Foundation Research Associate
Mr. Peter Horanyi	Biochemistry and Molecular Biology
Dr. Yao-wen Huang	Food Science and Technology

## ❧ *Thanks and Acknowledgements* ❧

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Dr. Katarzyna Jerzak	Comparative Literature
Dr. Pamela B. Kleiber	Honors Program and CURO
Dr. Larry Nackerud	Social Work
Dr. Hugh Ruppensburg	English
Dr. David Williams	Religion, Honors Program

### *CURO Seminar Faculty*

Professor Mark Callahan	Ideas for Creative Expression (ICE)
Dr. Ron Carroll	Ecology
Dr. Kathleen deMarras	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
Prof. Marc L. Lipson	International Business
Dr. Tricia Lootens	English
Dr. Larry Nackerud	Social Work
Prof. Jeffrey Netter	Banking and Finance
Dr. Rosemary Phelps	Counseling and Human Development Services
Dr. David Porter	Botany
Dr. Dean Rojek	Sociology
Dr. Paul Schroeder	Geology
Dr. Scott Shamp	Telecommunications
Dr. Michael Terns	Biochemistry and Molecular Biology
Dr. Kecia Thomas	Psychology
Dr. Katharina Wilson	Comparative Literature

### *Karen A. Holbrook Academic Support Award Reviewers*

Dr. Daniel Colley	Director, Center for Tropical and Emerging Global Diseases
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	<i>Multivariate Harmonic Analysis</i>
Faculty Mentor	Dr. Andrew Sornborger, Department of Mathematics, University of Georgia

#### **2004 Award**

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

**The Effects of Total Communication on the Comprehension Abilities of 1<sup>st</sup> 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 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 conidiation 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 *Aspergillus 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 tRNA<sup>Trp</sup> and tRNA<sup>Pro</sup>. 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 tRNA<sup>Pro</sup> and tRNA<sup>Trp</sup>. 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 tRNA<sup>His</sup> and tRNA<sup>Cys</sup>. 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 *hspX* 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 *hspX* deletion mutant will be complemented with the various effected genes. The *hspX* 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 cm<sup>3</sup>) 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

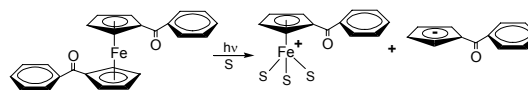
that batterer intervention programs can be extremely successful if used properly. Through examining recent research on batterer counseling programs, numerous problems have been observed and several improvements have been suggested to make the Batterer Intervention Program a more beneficial program for 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  $\beta(1-6)$ -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  $\beta(1,6)$  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***

Brunilis 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 substrate. 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, dimer 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 experimental 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 therapeutic 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 Chotiawat, 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) initiates 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  $\mu$ g  $\alpha$ hCRF-(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  $\alpha$ hCRF 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 angiopoietin-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 Nucleus 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 not 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- $\mu$ m 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 (IFN $\gamma$ ), which is crucial for parasite control. However CD8+ T cells isolated from muscle of *T. cruzi*-infected mice are hyporesponsive for IFN $\gamma$  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)<sub>6</sub> 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 carboxymethylation. 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 lose 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 m<sup>2</sup> 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 [<sup>125</sup>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  $\alpha 4\beta 2$  nAChR subtype is particularly susceptible to nicotine induced upregulation, and the greater upregulation of [<sup>125</sup>I]epibatidine labeled receptors in juveniles seen in this study could be due an enhanced adaptive responsiveness of the  $\alpha 4\beta 2$  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<sub>2</sub> 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 was then 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 activation 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 into 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<sup>+</sup>/I<sup>-</sup> 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 hardness 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  $\alpha$  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 to 16.2% +/- 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 Ax11, 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, Ax11p 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 Ax11p and Ste23p. IDE is proposed to have a role in the prevention of Alzheimer’s disease. Both Ax11p 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 Ax11p, Ste23p, and IDE via genetic tests. As a starting point for this study, a collection of Ax11p, 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 Ax11, 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 ax11, 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, Ax11 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<sup>-6</sup> 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<sup>-10</sup>, 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 its 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,  $\beta$  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 Eosinophilia (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 extracellular 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 phosphotransferase 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 [<sup>125</sup>I] hCG were conducted in order to measure receptor-hormone affinity, and radioimmunoassays were used to measure concentrations of cAMP after hCG stimulation. 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 pathophysiological 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. Quintio” 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  $\Phi$ 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 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 inattentive 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  $\mu$ l of *C. parvum* ( $1 \times 10^5$  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 bromodeoxyuridine, the cells were stained with a primary antibody that attaches to the incorporated bromodeoxyuridine and a secondary antibody that adds fluorescence 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 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 cytosolic 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 medical 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 incorporates 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 from 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 transcription, 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:  $\alpha$ ,  $\beta$ ,  $\beta'$ , and  $\gamma$ , 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 performed 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](http://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 as 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.

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