

THE UNIVERSITY OF GEORGIA
CENTER FOR UNDERGRADUATE RESEARCH OPPORTUNITIES



2012

CURO

Symposium

Program and Abstracts

CURO Office
203 Moore College
The University of Georgia
Athens, GA 30602
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<http://www.curo.uga.edu>

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CURO

April 2, 2012

Dear Students, Faculty, and Guests:

Welcome to the 12th annual CURO Symposium, UGA's celebration of undergraduate research across the disciplines. Many individuals—administrators, faculty members, staff, graduate students, and, of course, undergraduates—have collaborated to make the CURO Symposium the premier undergraduate academic event at UGA, and the 2012 CURO Symposium is the largest to date. The first CURO Symposium featured a handful of students presenting to each other around a single table. Today, nearly 200 undergraduate researchers will communicate their substantial accomplishments to their peers, mentors, and the public at large.

From its inception, the CURO Symposium has showcased research and scholarship in all disciplines. The 2012 Symposium continues that commitment, featuring presenters from 49 departments in 14 colleges/schools. Thus, today evidences UGA's broad and substantial support of research, and the invaluable commitment of UGA's administration and faculty to mentoring and providing exceptional learning opportunities for our undergraduates.

Thank you for your continued support of undergraduate research and CURO.

Sincerely,

A handwritten signature in black ink that reads "David S. Williams". The signature is written in a cursive style with a large, sweeping initial "D".

Dr. David S. Williams, '79, '82
Associate Provost and Director

Acknowledgements

Special Assistance for 2012 CURO Symposium

Ms. Heather Carlson	Assistant to the Director, Honors Program
Ms. Whitney Ising	Student Worker, CURO
Mr. Alex Knoblock	Student Worker, CURO
Ms. Gwen Nuss	Administrative Associate, CURO
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors Program
Ms. Chelsea Smith	Administrative Associate, External Affairs, Honors Program

Technology Equipment and Support

Center for Teaching & Learning
College of Agricultural & Environmental Sciences
College of Education
Franklin College of Arts & Sciences
Grady College of Journalism & Mass Communication
Honors Program
Terry College of Business

Faculty Reviewers for 2012 CURO Research Mentoring Awards

Dr. Brian Cummings	Pharmaceutical & Biomedical Sciences, College of Pharmacy (2009 Early Career Award)
Dr. Anna Karls	Microbiology, Franklin College of Arts & Sciences (2009 Early Career Award)
Dr. William Kisaalita	Biological and Agricultural Engineering, College of Agricultural & Environmental Science (2005 Master Level Award)
Dr. John Maerz	Vertebrate Ecology, Warnell School of Forestry & Natural Resources (2010 Early Career Award)
Dr. Walter Schmidt	Biochemistry & Molecular Biology, Franklin College of Arts & Sciences (2008 Early Career Award)

Faculty Reviewers for 2012 CURO Summer Research Fellowships

Dr. Carl Bergmann	Biochemistry & Molecular Biology
Dr. Brian Cummings	Department of Pharmaceutical and Biomedical Sciences
Dr. Monica Gaughan	Department of Health Policy & Management
Dr. Patricia Hunt-Hurst	Department of Textiles, Merchandising, & Interiors
Dr. John C. Inscoe	Department of History
Dr. Fran Teague	Department of English

Faculty Reviewers for 2012 CURO Symposium Best Paper Awards

Prof. Mark Callahan	Lamar Dodd School of Art
Dr. Tim Hoover	Department of Microbiology
Dr. John C. Inscoe	Department of History
Dr. Russ Karls	Department of Infectious Diseases
Dr. Pamela Orpinas	Department of Health Promotion & Behavior
Dr. Andy Owsiak	Department of International Affairs
Dr. Fran Teague	Department of English

Acknowledgements

Graduate Student Reviewers for 2012 CURO Symposium Best Paper Awards

Ms. Mollie Barnes	Department of English
Ms. Lisa Bolding	Department of English
Mr. Sean Buskirk	Department of Infectious Diseases
Mr. Paul Carlsen	Department of Political Science
Ms. Teneema Kuriakose	Department of Infectious Diseases
Ms. Adrienne Madison	Department of Engineering
Ms. Cary McGinnis	Department of Pharmaceutical & Biomedical Science
Ms. Crystal Phillips	Department of Microbiology
Mr. Alexander Vaughn	Department of Chemistry

Oral Session Conveners for 2012 CURO Symposium

Ms. Lisa Bolding	Department of English
Ms. Joy Bracewell	Honors Program
Mr. Sean Buskirk	Department of Infectious Diseases
Ms. Rebecca Cheney	Honors Program
Mr. Douglas Eudy	Institute of Plant Breeding, Genetics & Genomics
Ms. Teneema Kuriakose	Department of Infectious Diseases
Ms. Adrienne Madison	Department of Biological Engineering
Ms. Cary McGinnis	Department of Pharmaceutical & Biomedical Sciences
Ms. Crystal Phillips	Department of Microbiology
Ms. Amanda Pretti	Honors Program
Dr. Martin Rogers	Honors Program
Mr. Alexander Vaughn	Department of Chemistry

Schedule

Monday, April 2, 2012

Oral Session I **9:05 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session II **10:10 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session III **11:15 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Oral Session IV **12:20 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session V **1:25 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

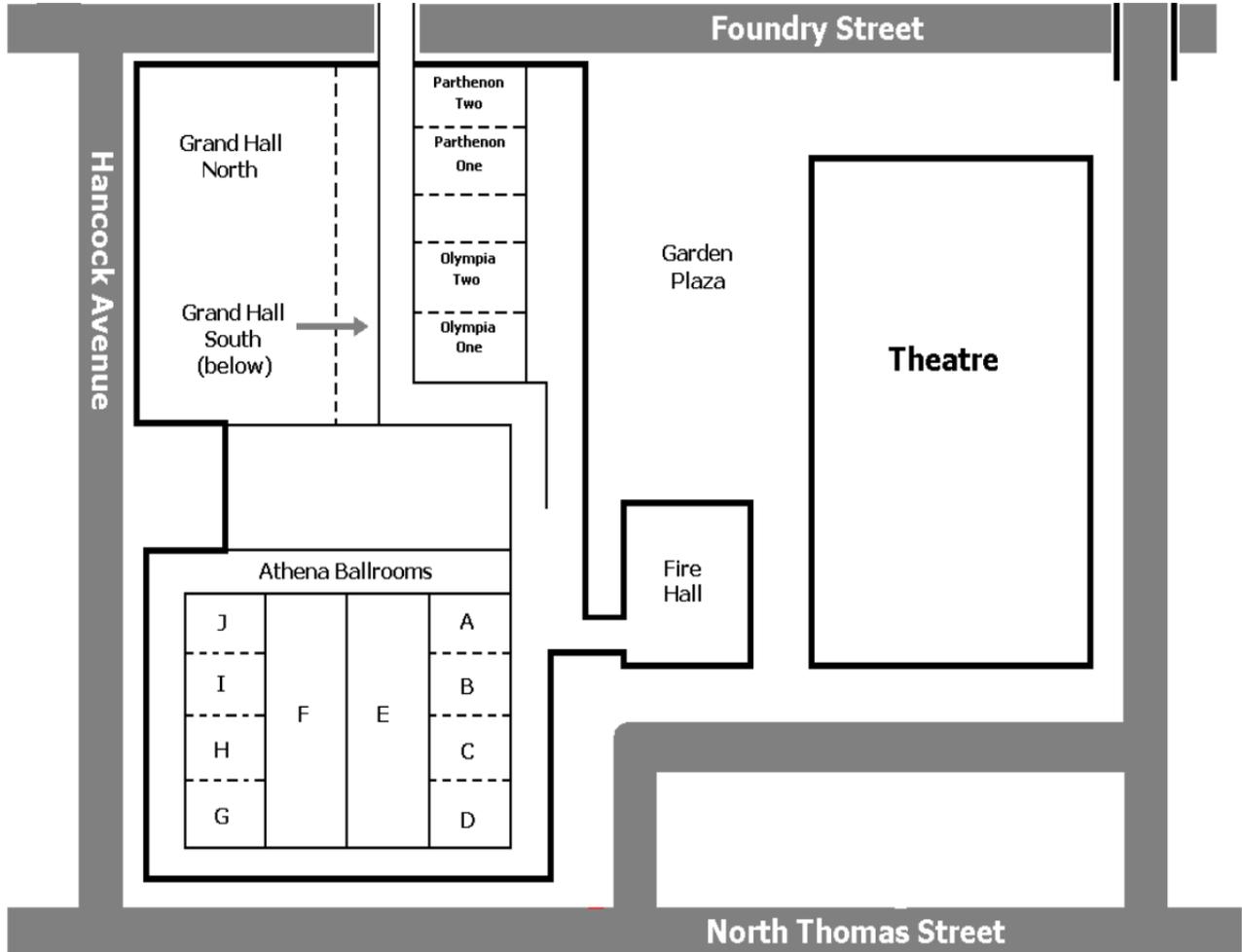
Oral Session VI **2:30 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Awards and Keynote Session **4:00 p.m.**
Classic Center, Athena Ballroom E

Poster Session and Reception **5:00 p.m.**
Classic Center, Grand Hall South (downstairs-use escalator in lobby)

The CURO 2012 Symposium will close at 6:00 p.m.

Classic Center Facility Layout



CURO Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the CURO Research Mentoring Award in 2001.

These awards recognize outstanding faculty who consistently make a concerted effort to engage undergraduate researchers and enhance the learning experience of undergraduates at The University of Georgia, especially through CURO. Award recipients have demonstrated superior research opportunities and mentoring programs for their undergraduate students, including outstanding teaching, supervision of undergraduate research courses and theses pursued through CURO, and collaboration on publications and presentations at professional conferences.

2012

Master Level Faculty Award

Dr. Lawrence Shimkets, Department of Microbiology

Early Career Faculty Award

Dr. Michael Yabsley, Warnell School Forestry & Natural Resources

2011

Master Level Faculty Award

Dr. Eric Stabb, Department of Microbiology

Early Career Faculty Award

Dr. John Drake, Odum School of Ecology

Program Award

Savannah River Ecology Laboratory

Dr. Kenneth McLeod, Interim Director

2010

Early Career Faculty Award

Dr. John C. Maerz, Warnell School of Forestry & Natural Resources

2009

Early Career Faculty Award

Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences

Dr. Anna C. Karls, Department of Microbiology

Dr. Dawn T. Robinson, Department of Sociology

2008

Master Level Faculty Award

Dr. John J. Maurer, College of Veterinary Medicine

Early Career Faculty Award

Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology

Program Award

Biomedical and Health Sciences Institute

Dr. Harry S. Dailey, Director

2007

Master Level Faculty Award

Dr. Timothy Hoover, Department of Microbiology

CURO Research Mentoring Awards

Early Career Faculty Award

Dr. Steven Stice, Department of Animal & Dairy Science

2006

Master Level Faculty Award

Dr. Patricia Hunt-Hurst, Department of Textiles, Merchandising & Interiors

Early Career Faculty Award

Dr. Rodney Mauricio, Department of Genetics

Graduate Student Award

Christopher Anderson, PhD candidate in Ecology

Graduate Student Recognition

Dawn Holligan, PhD candidate in Plant Biology

2005

Faculty Award

Dr. Gary Barrett, Odum School of Ecology

Dr. Sidney Kushner, Department of Genetics

Department Award

Department of Cellular Biology

2004

Faculty Award

Dr. William S. Kisaalita, Department of Biological & Agricultural Engineering

2003

Faculty Award

Dr. Jody Clay-Warner, Department of Sociology

Department Award

Department of Microbiology

Dr. Duncan Krause, Department Head

Dr. Timothy Hoover, Undergraduate Coordinator

Program Award

The Pratt Laboratory of Plant Genomics and Bioinformatics

Dr. Lee H. Pratt, Department of Plant Biology

Dr. Marie-Michèle Cordonnier-Pratt, Department of Plant Biology

2002

Faculty Award

Professor William D. Paul, Jr., Lamar Dodd School of Art

Dr. Katherine Kipp, Department of Psychology

Faculty Recognition

Dr. Susan Sanchez, College of Veterinary Medicine

Department Award

Department of Biochemistry & Molecular Biology

Dr. J. David Puett, Department Head

Program Award

“Physics Beyond the Boundaries”: National Science Foundation, REU Program

Dr. Loris Magnani, Principal Investigator, Department of Physics & Astronomy

CURO Research Mentoring Awards

Dr. Heinz-Bernd Schuttler, Department Head, Department of Physics &
Astronomy

Dr. Jonathan Arnold, Department of Genetics

Dr. Susmita Datta, Georgia State University

Dr. David Logan, Clark Atlanta University

Dr. William Steffans, Clark Atlanta University

2001

Faculty Award

Dr. Marcus Fechheimer, Department of Cellular Biology

Faculty Recognition

Dr. David MacIntosh, Department of Environmental Health Sciences

Dr. Dean Rojek, Department of Sociology

Department Award

Department of Genetics

Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory

Dr. Paul Bertsch, Director

CURO Symposium Best Paper Awards

Since 2001, CURO Symposium Best Paper Awards have recognized excellence in papers developed from work being presented at that year's Symposium.

Applicants may submit in one or more of the following categories: arts, humanities, social sciences, civic responsibility focus, international focus, biological sciences, and physical sciences

Each recipient is recognized at the Symposium's Award and Keynote Session, and each award carries \$100 in financial support, generously provided by the UGA Alumni Association. Winners from the 2012 CURO Symposium are listed below.

Arts:

Brendan Boyle	The New Western: Classical Genre Cinema in the 21st Century
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Biological Sciences:

Tommaso Tosini	Characterization of Cone Degeneration in the Opn1.GFP Transgenic Mouse Retina
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Civic Responsibility Focus:

Emily Fountain	Segregation in a Modern Age: Systematic Patterns and Consequences
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Humanities:

Joshua Trey Barnett	We Are All Royalty: Narrative Comparison of a Drag Queen and King
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Hope Rogers	No Triumph without Loss: Problems of Interracial Collaboration in Tolkien's Works
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International Focus:

Logan Krusac	Individual Environmental Awareness and Urban Water Conservation in Kunming, China
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Physical Sciences:

Christopher Sudduth	Measuring Chronic Ankle Instability in a Recreationally Active Population
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Social Sciences:

Matthew Taylor	Teacher Evaluation Methods in Georgia Public Schools
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Program

Monday, April 2, 2012

Concurrent Oral Sessions

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

9:05 – 9:55 a.m. Session I

Room A	Caitlin McManemon	Discrepancy Between Client Expectations and Doctor Reports of the Success in Treatment of Veterinary Patients
	Mark Zapata	Reversal of Acepromazine Sedation by Doxapram in Dogs
	Amita Nawathe	Gestational Diabetes Education Program
Room B	Mark Rolfsen	The Implementation of Effective Smoking Cessation Interventions for Drug and Alcohol Addicts in Substance Abuse Treatments
	Christopher Sudduth	Measuring Chronic Ankle Instability in a Recreationally Active Population
	Philip Oldham	Truth in Labeling: Nutritional Value Under NLEA
Room C	Elena James	Development of a Genetic Screen for Vitamin B12 Uptake Mutants in Mycobacteria
	Alexandra Dodd	The Role of Galacturonosyltransferase in the Acetylation and Methylation of Homogalacturonan During Pectin Biosynthesis
	Abby Weinberger	Cognitive Measures, Antisaccade Performance and Obesity in Children
Room D	Natalya Haas	A Piece of the Puzzle: Why People Wear Peace Signs Today
	Ransom Jackson	The Belle and the Behemoth: <i>Uncle Tom's Cabin</i> and the Southern White Woman
	Nicole Armbrust	Kathoey: Dress, the Only Opportunity for Success
Room G	Catherine Debban	Do Mushroom-Feeding <i>Drosophila</i> Self-Medicate with Alpha-Amanitin in Response to Nematode Parasitism?

Program

	William Costanzo	Algae Biofuel Development: Growth Efficiency
	Matthew Smith	Determination of Virulence Factors Associated with <i>Histomonas meleagridis</i> ? Cause of Blackhead's Disease in Gallinaceous Birds
Room H	Alexis Garcia	The Militarization of U.S. Intelligence?
	Sophie Giberga, John Henry Thompson	Drilling for the Future: Domestic Oil Production and Meeting America's Energy Needs
Room I	Julian Rios	DNA Hybridization in the Presence of Single-Walled Carbon Nanotube/ssDNA Complexes
	John Liu	The Relationship Between Macular Pigment and Neural Compensation
	Andrew Suddreth	Proteome Studies of the Interaction Between <i>Botrytis cinerea</i> and Tomato Fruit
Room J	Star Ye	The Effect of Hypoxia on Transketolase in Breast Cancer Cells
	Patrick Wheat	U.S. Policy Alternatives to a Military Takeover in Egypt
	Dhillon Zaver	Photoimmunotherapeutic Nanoparticles for Combination Therapy of Breast Cancer
10:10 – 11:00 a.m. Session II Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J		
Room A	Brittany Feldhaeusser	Influence of Different Cell Storage/Culture Conditions on Spontaneous Proliferation and Tyrosine Kinase Receptor Inhibition in Two Feline Injection-Site Sarcoma Cell Lines, In Vitro
	Lauren Sullivan	Pathogenesis of Chicken Astrovirus as Studied by In-Situ Hybridization
Room B	Justin Smith	Characterization of a Putative Endonuclease-RNA Complex Involved in CRISPR-Mediated Viral Defense
	Jenny Brickman	Correlations Between Ankle Laxity and Dynamic Postural Stability

Program

	Nathan Usselman	Optimization of Surface-Initiated Kumada Catalyst Transfer Polycondensation
Room C	David Parker	The Effects of Volume Removal on Values of Fractional Anisotropy
	Stephen Robertson, Aaron Murray	An Examination of Communication and Employee Engagement
Room D	Katherine Black	Differences in Functional Movement Screen Scores Between Genders in NCAA Division I Athletes
	Suzanne Meller	Emotion Regulation and Childhood Depression: An Examination of Moderators
	Yiran (Emily) Peng	Reducing Costs and Maintaining Quality: Alternatives to Fee-for-Service in Federal Health Insurance Plans
Room G	Rachel Bonds	Outward Migration and the Kenyan Economy: Transforming the Brain Drain to a Brain Gain
	Dana Schroeder	Progress Toward Sustainability Goals at UGA's Costa Rica Campus in San Luis de Monteverde, Costa Rica
Room H	Melissa McDaniel	War, Peace, and Seduction: An Analysis of Tolstoy's H�el�ene Kuragin as a Symbol of Female Sexuality
	Audrey Glasgow	The Uses and Effects of Music in the Conflict in Northern Ireland
	Brittany McGrue	Public Art in Athens-Clarke County
Room I	Malavika Rajeev	Predictors of Tick Burden and Engorgement in Grant's Gazelle
	Jenna Grygier	Management of Marine Debris in the U.S.: A Survey of Options and Database for Decision-Makers
Room J	William French, Ryan McLynn	The Effect of Protein Kinase Inhibitors on the Growth of <i>Plasmodium falciparum</i>
	Cameron Zahedi	Addressing Students' Math Deficiencies in Introductory Physics with Online Scaffolded Problems
	Matthew Taylor	Teacher Evaluation Methods in Georgia Public Schools

Program

11:15 – 12:05 p.m. Session III

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Room A	Daniel Smith	Inferno
	Lea Rackley	Finding the Child in Children's Literature
	Meghan Russell	Architecture and Dress
Room B	Elizabeth Crowley	Racial Inclusivity and Exclusivity in HBO's <i>True Blood</i> : A Viewer-Response Critique via Hans Robert Jauss's "Horizon of Expectations"
	Lauren Anderson	The Legacy of Truth: Analyzing the TRC's Impact on South Africa's Millennial Generation
	Anisha Hegde	Increasing Breastfeeding Rates in Athens-Clarke County
Room C	Marianne Ligon	Characterization of the Tneap Complex in the CRISPR-Cas Viral Defense System of Prokaryotes
	Joshua Parker	Investigating Post-Translational Modification and Activity of Zebrafish Glycosidases
	Stephen Bocarro	The Characterization of Long Flagella 4 Protein in <i>Tetrahymena</i>
Room D	Waring Tribble III	Manipulating Tropical Fire Ant Populations to Decrease the Coffee Berry Borer
	Katrina Egan	Effect of Anesthetic Variables on Recovery Time in Dogs
	Chelsea Renier	Does Eggshell Pigmentation Reflect Female Condition in Broiler Breeder Hens?
Room G	Joshua Trey Barnett	We Are All Royalty: Narrative Comparison of a Drag Queen and King
	Tyler Bugg	'All Truth is Bitter': Legacies of a Post-Apartheid, Post-TRC South Africa
	Emily Fountain	Segregation in a Modern Age: Systematic Patterns and Consequences

Program

Room H	JoyEllen Freeman	A Portrayal of Power: Black Nationalism in the Documentary <i>Now Is the Time</i>
	Anna Beth Havenar	An Affect Control Theory Analysis of Islam and Christianity
	Connor Land	Information as Narrative Poison or Poultry in Ergodic Literature
Room I	Benjamin Harris	Race Relations in Brazil Between 1890 and 1920
	Samuel Kinsman	Private Equity in Brazil
12:20 – 1:10 p.m. Session IV Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J		
Room A	Tyler Bugg	Giving Voice to Silence: Theatre and Community in <i>He Said, She Said, Zhe Said: Gender Stories</i>
	Emily Jessup	Noah Webster's <i>American Spelling Book</i> as a Product of Colonial American Culture and Economics
	Brendan Boyle	The New Western: Classical Genre Cinema in the 21st Century
Room B	Abid Fazal	Production of Saccharification Enzymes by Recombinant Fungus Grown on Pectin-Rich Biomass Materials
	Charles Blair III	A Shot in the Dark: How Information Affects Consumer Light Bulb Purchases
	Heather Hatzenbuehler	Residential Electricity Consumption and Affordability of Efficiency and Clean Energy Upgrades
Room C	Peter Sisk	Proteomics Analysis of Canine Prostate Carcinoma Tissue: A Potential Animal Model of a Human Disease
	Sam Hempel	Developing Kinetic Genotype-Phenotype Correlations for Missense Point Mutations in Human Protein O-Linked Mannose β -1,2 N-Acetylglucosaminyltransferase (POMGnT1)

Program

	Lindsey Megow	Effects of Helminth Infection on Local and Systemic Immunity
Room D	Tanya Dieumegarde	The Responsiveness of Mothers in Organic and Inorganic Nutrition in Ghanaian Children and the Social and Economic Implications
	Todd Pierson	Narcotics-Trafficking, Cloudforests, and a Killer Fungus: Amphibian Conservation in Central America
	Garrett Melick	Histological and Protein Expression Changes in Mouse Models of Early Dystroglycanopathy
Room G	Anita Bhagavathula	Vitamin D Deficiency in the African American Population
	Smitha Ganeshan	Access to Primary Care Services in Athens
	Bryn Murphy	Prospect Theory and Common Action Problems: Loss Aversion in International Riparian Treaty Compliance
Room H	Erin Giglio	The Role of Sensory Systems in <i>Drosophila</i> Courtship Across Populations
	Allyson Byrd	Comparative Genomics of Ribosomal RNAs in Malaria Parasites
	Daniel Guidot	Description and Measurement of Response to Osmotic Stress in <i>Toxoplasma gondii</i>
Room I	Hope Rogers	No Triumph Without Loss: Problems of Interracial Collaboration in Tolkien's Works
	Stephanie Talmadge	Social Media's Effect on the Arab Spring Revolutions
	Sarah Mitchell	Effect of Sugar on Brain Peptides
Room J	Stephanie Wilding	Expression of Secretory Phospholipase A2 in Prostate Cancer Cells Lines
	Lauren Titus	The Effect of Lipoic Acid on Inflammatory Cytokines and Messenger RNA Levels in Microglial Cells

Program

Michael Webber

Methionine Sulfoxide Reductase Gene Regulation
in *Vibrio fischeri*

1:25 – 2:15 p.m. Session V

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Room A	Debashis Ghose, Sr.	Stability Analysis of the Inhibitor Resistant Phenotype of AJP50 in Biomass Fermentations
	Philip Grayeski	Genetic Manipulation of <i>Caldicellulosiruptor bescii</i> for Biomass Utilization
	Heather Hatzenbuhler	Legal Approaches to Addressing Water Pollution Risks Related to “Fracking” in the Marcellus Shale Region
Room B	Brooke Bauer	Organizational Commitment in the Workplace
	Anna Wilson	A Sociolinguistic Perspective on Roswell, GA
	Suze Valmé, Morgan Capps	An Investigation of the Role of Work Status in Relation to Company Growth
Room C	Melanie Fratto	Infection Modifies the Effects of Stress on Immune Function in Birds
	Daniel Pique	Regulation of the Cell Cycle in the African <i>Trypanosome</i> by Small Molecule Inhibitors and Serum Deprivation
	Jennifer Hegarty, Laura Hegarty	Recycling and End-Use Industries in Georgia
Room D	Ashley Blackburn	High Resolution Behavioral Economic Analysis of the Price Sensitivity of Smoking Cessation Motivation
	John Rodriguez	Combatting Obesity by Eliminating Food Deserts in Athens-Clarke County
	Dev Iyer	Prisons for Profit: A New Approach to the Private Prison Model in the State of Georgia
Room G	Terese Gagnon	Landscapes of the Interior: Ethnobotany and Senses of Place Among Karen Refugees

Program

	Khai Nguyen	Post-Katrina Recovery Processes in the Vietnamese-American Community
	Cody Knapp	International Boundary Settlement and Domestic Conflict
Room H	Kieran Maynard	Lost Chapters in the <i>Wind-Up Bird Chronicle</i> : A Translation and Commentary
	Sarah Potter	Aporetic Structure in Marcel Proust's <i>In Search of Lost Time</i>
	Elina Kumykova	Exploring Medical Practice Through Chekhov's Literature
Room I	Connor Sweetnam	The Interaction of Tau Proteins and Hirano Bodies
	Farres Obeidin	Modeling Subtelomeric Growth and the Adaptive Telomere Failure Hypothesis
	Casey Love	Phospholipase Expression in Cocaine-Addicted Rats
2:30 – 3:20 p.m. Session VI Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I		
Room A	Katherine Helmick	Dietary Resource Partitioning of the Southern Flying Squirrel (<i>Glaucomys volans</i>)
	Brigid Burns	Anesthetic Complications in Dogs Undergoing Surgery for Liver Disease
	Kelsey Campolong	The Role of Coagulation in Cerebral Malaria in the Mouse Model
Room B	Theresa Stratmann	The Science of Monitoring Rare Species: Developing Methods to Locate and Survey for the Endangered Bog Turtle
	Ruth Davis	An Alternative Perspective?: Dora Mayer's Contributions to the Peruvian <i>Indigenismo</i> Movement
	Kayci Schoon	The Resistance Complex in Lyon: Politics, Memory, History

Program

Room C	Hope Rogers	The Skeleton in the Closet: Deadly Duplications in Mary Shelley's <i>Frankenstein</i>
	Christopher Bailey II	Computational Modeling of Emergent Dynamics in Language
Room D	Tuiumkan Nishanova	Assembly and Subspeciation of Haptoglobin-Related Protein Containing High-Density Lipoproteins
	Joseph Hill, Brittany Feldhaeuser	Effects of Platelet-Derived Growth Factor Receptor Inhibition on Feline Injection-Site Sarcoma Radiosensitivity
	Nakul Talathi	Characterization of <i>cis/trans</i> Phosphorylation Modes in a Eukaryotic Protein Kinase
Room G	Eilidh Geddes, Avery Wiens	Teacher Attrition: Possible Policy Solutions
	William Smith	Compelling State Interest: A Study of the Unequal Application of Strict Judicial Scrutiny
	Logan Krusac	Individual Environmental Awareness and Urban Water Conservation in Kunming, China
Room H	Luben Raytchev	Haemogregarines of Freshwater Turtle Species: Does Basking Behavior Influence Parasitemia Levels?
	Osama Hashmi	Analysis of the Legal Needs of Primary Care Physicians
	Allison Doyle	Increasing Access to Primary Care for Low-Income Rural Georgians
Room I	Paul Havenstein	Rastafari: Continuity, Discontinuity, and Present Identity
	Aaron Murray	Measuring Transformational Leadership in the NFL

4:00 p.m. Awards and Keynote Session
Classic Center, Athena Ballroom E

Welcome and Introductions

Dr. David S. Williams, Associate Provost and Director, Honors Program

Program

Remarks	Professor Jere W. Morehead, Senior Vice President for Academic Affairs and Provost
Introduction to Awards	Dr. William Kisaalita, Associate Director, CURO
CURO Research Mentoring Awards	Dr. David C. Lee, Vice President for Research
2012 Symposium Best Paper Awards	Dr. Laura Jolly, Vice President for Instruction Ms. Deborah Dietzler, Executive Director, Alumni Association
UGA Libraries' Research Awards	Ms. Caroline Barratt, Director, Miller Learning Center Library Commons
Introduction of Keynote Speaker	Ms. Dana Higgins, Foundation Fellow '12, International Policy
Keynote Address	Dr. Charles Bullock, Richard B. Russell Professor of Political Science "A Prospective Look at the 2012 Elections"
Closing Comments	Dr. David S. Williams, Associate Provost and Director, Honors Program
5:00 p.m. Poster Presentations Classic Center, Grand Hall South (downstairs - use the escalator in the lobby)	
Poster #1	Aditya Aphale Test-Retest Reliability and Data Analysis for the NeuroCom Postural Stability Test
Poster #2	Charlotte Ball Assessment of Fukutin's Biological Function by Identification of Associated Proteins
Poster #3	Stephen Bocarro The Characterization of Long Flagella 4 Protein in <i>Tetrahymena</i>
Poster #4	Kathryn Briggs Insertion of Hemagglutinin Gene from H5N1 into Parainfluenza Virus Type 5 (PIV5) Offers Immunity in Mice Against H5N1 Challenge
Poster #5	Melissa Brown Black Stereotypes in Reality Television and the Reinforcement of Prejudiced Attitudes
Poster #6	Allyson Byrd Comparative Genomics of Ribosomal RNAs in Malaria Parasites

Program

Poster #7	Neal Canlas, Michael Theobald	Arterial Flow Pattern in People with Peripheral Arterial Disease
Poster #8	Vinay Choksi	Mating Regulates Germ Line Stem Cell Division Frequency in Testes of <i>Drosophila melanogaster</i>
Poster #9	Dervin Cunningham, Jr.	Proteomic Analysis of the Tomato/ <i>Botrytis cinerea</i> Interaction
Poster #10	Kasey Darley	A Therapeutic Nanoparticle Platform for Targeting Mitochondrial Superoxide
Poster #11	Tanya Dieumegarde	The Responsiveness of Mothers in Organic and Inorganic Nutrition in Ghanaian Children and the Social and Economic Implications
Poster #12	Alexandra Dodd	The Role of Galacturonosyltransferase in the Acetylation and Methylation of Homogalacturonan During Pectin Biosynthesis
Poster #13	Sarah-Bianca Dolisca	The Sweet Connection: O-linked β -N-Acetylglucosamine Transferase and Cancer Stem Cells
Poster #14	Abid Fazal	Production of Saccharification Enzymes by Recombinant Fungus Grown on Pectin-Rich Biomass Materials
Poster #15	Brittany Feldhaeusser	Influence of Different Cell Storage/Culture Conditions on Spontaneous Proliferation and Tyrosine Kinase Receptor Inhibition in Two Feline Injection-Site Sarcoma Cells Lines, In Vitro
Poster #16	Hope Foskey	Identification of GABA-Responsive Neurons in the Zebrafish Brain
Poster #17	William French, Ryan McLynn	The Effect of Protein Kinase Inhibitors on the Growth of <i>Plasmodium falciparum</i>
Poster #18	Nisha George	The Role of Cysteine Residues in the Function of Ras Converting Enzyme
Poster #19	Mina Ghobrial	Testing Algorithms to Predict Onset of Cerebral Malaria in Murine Model
Poster #20	Philip Grayeski	Genetic Manipulation of <i>Caldicellulosiruptor bescii</i> for Biomass Utilization

Program

Poster #21	Daniel Guidot	Description and Measurement of Response to Osmotic Stress in <i>Toxoplasma gondii</i>
Poster #22	Tyler Haeffs	Limb Morphology and Sequence Divergence in the <i>fgf</i> Genes of <i>Anolis</i> Lizards
Poster #23	Hannah Hanley	Digital Analysis of Feline Bone Marrow Fat Content
Poster #24	Alexander Hansen	Relationship Between Left Uncinate Fasciculus White Matter Integrity and Verbal Memory
Poster #25	Jennifer Hegarty, Laura Hegarty	Recycling and End-Use Industries in Georgia
Poster #26	Alexander Herzog	Protein-Glycosaminoglycan Interaction Studies Using Surface Plasmon Resonance (SPR)
Poster #27	Rachel Johnson	Examining Genetic Diversity in Peruvian Samples of <i>Plasmodium falciparum</i>
Poster #28	Mathew Joseph	Inflammatory Cell Markers' Gene Expression in Mouse Model of Placental Malaria
Poster #29	Michael Klodnicki	A New Approach to Histomoniasis: Data Mining and Targeted Drug Sensitivity
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The Legacy of Truth: Analyzing the TRC's Impact on South Africa's Millennial Generation

Lauren Anderson, CURO Summer Fellow
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Following years of racial violence and political negotiations, post-apartheid South Africa established the Truth and Reconciliation Commission (TRC) to investigate past human rights violations and develop a culture of peace. From 1996 to 2001, the TRC accepted over 21,000 victim testimonies and incorporated victim and amnesty hearings in an effort to collect a full and accurate historical record. However, since the release of the TRC's Final Report, few studies have sought to examine the long-term implications of the TRC's work, especially among young people who were not involved in the commission process. For this project, I conducted eleven semi-structured interviews with students at the University of Stellenbosch in Stellenbosch, South Africa. Utilizing questioning that gauged the participants' understanding of the TRC and contemporary racial and political realities, I implemented a qualitative analysis of the data, paying particular attention to commonalities in the responses. In general, the participants relayed favorable opinions of the TRC as an institution and indicated positive attitudes of present racial tolerance and social integration. Nevertheless, there is little evidence that the TRC has contributed to these progressive relations, suggesting that the TRC has failed to directly influence lasting reconciliation. While these results question the success of the TRC's efforts, I attribute this conclusion to the TRC's methodological practices as opposed to the truth commission itself. By illuminating the structural weaknesses of the TRC, this study ultimately seeks to provide insight for other post-conflict societies, as well highlight the limitations of truth in correcting socio-economic inequities.

Test-Retest Reliability and Data Analysis for the NeuroCom Postural Stability Test

Aditya Aphale
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Sport-related concussion accounts for about 5% of the injuries in intercollegiate football. A concussion occurs when a blow to the head affects neurological function. A multifaceted approach to concussion management includes self-reporting symptoms, neuropsychological testing, and balance testing. The NeuroCom Smart Master Balance System is an instrument used to assess postural stability following a concussion. The assessment tests responsiveness of the visual, vestibular, and somatosensory systems. In order to determine whether the NeuroCom can be used as a viable tool in concussion assessment, the reliability of the instrument must be assessed. The purpose of this project was to assess the test-retest reliability using clinically relevant time periods (Baseline, Day 45, and Day 50) which have been previously used to establish the reliability of neuropsychological testing. The NeuroCom consists of a force plate and a surround that sways in response to a person's movement. There are six different conditions administered that assess the various physiological systems involved with balance. Participants in the study were divided into two groups. The first group (Group A) had the test's conditions administered in a fixed order while the second group (Group B) had the conditions administered in a random order. Mean stability values and intraclass correlation coefficients (ICC) were computed. Group B had generally higher ICC values than Group A, with ICCs in the 0.7-0.8 range. While these ICC values are acceptable, the addition of self-report symptoms and neurocognitive test to the NeuroCom assessment would strengthen diagnosis and return-to-play decisions following sport-related concussion.

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Kathoeys: Dress, the Only Opportunity for Success

Nicole Armbrust

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In present day Thailand, there are over 100,000 transsexual males, termed Ladyboys or Kathoey, to whom dress and beauty play significant roles in displaying their true identities. Kathoey believe themselves to be women trapped inside male bodies and consequently dress and exude female personas (Forbes, 2002). Although Thailand is said to be accepting of their transgenders, Ladyboys are still denied political and legal rights to their womanhood in addition to being discriminated against and stereotyped frequently. By studying Thai religion and culture and analyzing journals and media on Kathoey livelihood, I have come to the conclusion that dress, appearances, and beauty are the most essential aspects of Ladyboys' lives and acceptance into Thai society. Throughout every stage in a Ladyboy's life, dress plays a vital role in the realization of their true nature and in changing them into what they want to be. The pinnacle of success for these Ladyboys is to become completely convincing women in every way, which is extremely difficult and only accomplished through dress practices. After studying the Kathoey of Thailand, it is evident that respect and acceptance is only attained if they are able to project perfect feminine beauty. Without dress practices, the discrimination and ostracism of transgenders would be significantly worse. Through this study, it is clear that members in any society who are deemed "different" use dress as a means of acceptance. I have ultimately found that dress and appearance play integral roles in societal approval, regardless of what culture one identifies with.

Computational Modeling of Emergent Dynamics in Language

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Computer simulation is the only way to study the adaptivity of language over time. There is no detailed diachronic source of language data with which to study the changes of language actually in use, leaving historical linguists to draw conclusions from inadequate remains. Consequently, this study uses a hand-crafted piece of software to unpack the mechanisms that contribute to the dynamic, emergent order found in language. The program's primary function is to run simulations according to user-specified, probabilistic rules, which take into account geographic and social factors (e.g., proximity, gender, race, age) sampled from actual linguistic survey data. My research consists primarily of exploring rule combinations in search of those rule sets that produce frequency distributions like those we know to exist, as found in the Linguistic Atlas Project. The simulation achieves success if such a rule set is found (i.e., one showing evolving, non-linear distributions of linguistic variants among the simulated speakers). There are two reasons this research is significant. First, it breaks new ground – no computer simulation of language has ever been validated against a data set as large and thorough as that contained in the Linguistic Atlas Project. Second, this simulation has the potential to provide insight into fundamental questions about language variation like "How important are social factors in influencing the way people speak?" and "What facilitates the spread of linguistic items within communities of different scales?"

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Assessment of Fukutin’s Biological Function by Identification of Associated Proteins

Charlotte Ball

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Mutations in fukutin can cause congenital muscular dystrophy (CMD); however, the exact function of fukutin is still undetermined. The purpose of our research is to gather information about fukutin’s biological role. Fukutin is known to be involved in the glycosylation of α -dystroglycan (α DG) because α DG is hypoglycosylated in fukutin patients. Proper α DG glycosylation is critical for maintaining the muscle cell membrane’s association with the extracellular matrix (ECM) as the absence of sugar moieties prevents the α DG to ECM interaction, leading to decreased stability of the sarcolemma and increased muscle cell death. To expand our understanding of fukutin’s role in α DG glycosylation, we will extract, purify, and identify proteins physically associated with fukutin. We used viral particles developed in-lab to deliver DNA encoding a tagged fukutin (3xHA) into fukutin-knockout mouse embryonic stem cells. From embryonic stem cell lysates, we have extracted fukutin and its associated proteins using the HA tag. Fukutin-associated proteins will be identified by mass spectroscopy, and known functions will be ascertained by database mining. Identification of fukutin binding proteins is critical to determining fukutin’s function and developing therapeutic strategies for fukutin-dependent muscular dystrophy.

We Are All Royalty: Narrative Comparison of a Drag Queen and King

Joshua Trey Barnett, CURO Summer Fellow
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Drag performances have been studied as important visible cultural sites of gender transgression. Few studies, however, have

sought to understand the ways in which drag performers—kings and queens—relate to and shape queer communities. In this manuscript we explore the narrative of a drag queen alongside a drag king in an effort to elucidate these relationships and the similarities and differences that become apparent between the two. Specifically, we are interested in how drag performers engage their drag personas for political and activist purposes as well as how the spaces they find themselves performing in influence their lived experiences. Seeking to understand drag performers through a genderqueer lens, which encourages engagement with the trans movement as a conduit for political expression, we employ narrative inquiry as a means by which to highlight and forefront the lived experiences of our participants.

Organizational Commitment in the Workplace

Brooke Bauer, CURO Summer Fellow
Dr. Robert Vandenberg, Management, Terry College of Business

Over the past thirty years commitment in the workplace has been researched and studied for the benefit of organizations. The results of measuring commitment in the workplace predict behaviors and attitudes of employees such as turnover, absenteeism, and performance. While the study of organizational commitment strengthens the organization’s recognition of their employees’ actions, the tools to measure commitment are highly outdated. The surveys used to measure commitment were developed during the post-depression era, and the questions within the survey focus more on earlier generations who were committed to their organizations for reasons that differ from the people entering in the workforce today. One of the most commonly used surveys is the Organizational Commitment Questionnaire. This questionnaire measures three different types of commitment: affective commitment, continuance commitment, and normative

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commitment. What I question is how relevant each type of commitment is to society today, and if there is not another form of commitment that more accurately measures commitment in the workplace. One element that my mentor, Dr. Vandenberg, and I believe should be incorporated within the definitions of commitment is “transitional commitment,” or the notion of remaining in an organization in order to further advance later in one’s career. This past summer, Dr. Vandenberg and I created a new survey with additional questions on transitional commitment and sent the survey to full-time employees enrolled in the MBA programs at UGA. Currently, Dr. Vandenberg and I continue to question and quantify the significance of changed perceptions on attitudes in the workplace.

Vitamin D Deficiency in the African American Population

Anita Bhagavathula

Dr. Daniel Promislow, Genetics, Franklin College of Arts & Sciences

Vitamin D deficiency has been associated with Inflammatory Bowel Disease (IBD) in Caucasians. Hypovitaminosis-D is reported to occur among individuals of color including African Americans (AAs). One could hypothesize having two risk factors (IBD and AA race) would result in severe vitamin D deficiency. Our aims were to determine vitamin D status, as measured by 25-hydroxyvitaminD(25(OH)D) in AAs, and to compare these results to Caucasians with IBD. Serum 25(OH)D was determined in 86 AAs with Crohn’s Disease(CD), 123 AA controls, and 62 Caucasians with CD(C-CD). Additional data (BMI, disease severity, and surgical history) were extracted following IRB approval. Vitamin D deficiency was defined as serum 25-hydroxyvitaminD \leq 20ng/ml based on the Institute of Medicine’s dietary reference intakes. Vitamin D deficiency was present in 67% of AA-CD cases compared to 76% of the disease-free AA controls (P-value

0.17). Only 35% of C-CD had a vitamin D deficiency compared to 67% of AA-CD subjects (p-value <0.001). In addition, AAs-CD had much lower vitamin D levels (17.70ng/mL) than their Caucasian counterparts (24.38ng/mL) with the same diagnosis. Linear regression analysis showed that there were no differences in vitamin D levels among AA by BMI, disease severity, or surgical history. Vitamin D deficiency is common in all AA subjects. In addition, AAs-CD have almost 4 times greater odds of having vitamin D deficiency compared to Caucasians-CD (95% CI 1.89-7.50). Unlike in Caucasians, the vitamin D levels are not affected by disease severity or IBD phenotype in AA-CD. Further, prospective studies are warranted to better understand vitamin D metabolism in AAs.

Differences in Functional Movement Screen Scores Between Genders in NCAA Division I Athletes

Katherine Black

Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Female athletes have documented differences in anatomical alignment of the lower extremity, and differences in strength may contribute to increased injury risk, including ligament sprains at the knee. The functional movement screen (FMS) is a quantifiable measure of athletes’ performance in 7 fundamental movements. These include lunging, squatting, stepping, and stabilizing. Our objective was to determine if there was a significant difference between FMS scores of female and male NCAA Division I athletes. Differences in scores may provide rationale for increased injury risk in females. FMS data were obtained from males and females on the cross country, track/field, swimming, and tennis teams. Scores were totaled and averaged over genders across teams. Percent differences were calculated on the total and 7 individual sub-tests. A 49.0% difference occurred between male and female

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scores on the push-up component of the FMS. Females had lower push-up scores than males. However, many of the female athletes had reported impingement pain while performing the task, so they were assigned a score of 0, not representative of their ability but of the presence of pain. The differences in the other tests were not clinically significant. It appears that male and female Division I athletes on those particular teams have comparable FMS scores in total and on sub-tests. The FMS may not provide rationale for or indicate why female athletes may be more at risk for specific injuries.

High Resolution Behavioral Economic Analysis of the Price Sensitivity of Smoking Cessation Motivation

Ashley Blackburn

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Tobacco use is the single largest cause of mortality in the United States, and understanding the factors that contribute to smoking cessation success is a priority for research. Previous research suggests that the cost of tobacco products plays an important role in successful smoking cessation. The purpose of this study was to better understand the relationship between cigarette price and smoking cessation motivation. A large sample of community smokers ($n = 1074$, 60.4% male, 67.5% Caucasian) were assessed using the Probability of Smoking Cessation Measure (PSCM), which assessed the estimated likelihood that an individual would quit smoking at a variety of cigarette prices ranging from free to \$10/cigarette (\$200/pack). Dependent variables from the PSCM included intensity (baseline quit motivation), breakpoint (price point corresponding to 100% quit probability), and P50 price (price point corresponding to 50% quit probability). Relationships between quit probability and demographic variables, measures of nicotine dependence severity, and self-reported smoking cessation variables were investigated.

As anticipated, quit probability increased as a function of escalating cigarette price. Individual indices from the PSCM measure were correlated with each other ($r_s = .13-.45$, $p_s < .001$). Significant correlations were present between PSCM variables and a number of demographic and smoking variables. Higher nicotine dependence ratings were significantly associated with lower intensity ($r = -.08$) and higher P50 price ($r = .10$). These results provide further evidence that price plays an important role in smoking cessation motivation and that meaningful differences exist by nicotine dependence severity.

A Shot in the Dark: How Information Affects Consumer Light Bulb Purchases

Charles Blair III

Dr. Robert Nielsen, Housing & Consumer Economics, College of Family & Consumer Sciences

In light of the pending elimination of incandescent bulbs from the market to make way for less familiar, energy efficient light bulbs, I will investigate the role that information plays in the consumer's decision to purchase light bulbs by answering the following research question: *How does information affect consumers' decisions when purchasing energy efficient light bulbs?* This will be done through the execution of a controlled experiment using control and treatment groups. Participants in the study will be drawn from the UGA community (faculty, staff, and students) and will be randomly assigned to either the control or treatment groups. In each group, the participants will be shown five compact fluorescent light bulbs equivalent to 60-watt incandescent bulbs. Both groups will be encouraged to examine the product packaging and unit price before indicating their purchase choice from the selection. Treatment group participants will receive additional external information about the bulbs and explanation of the different

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bulb qualities that are useful when shopping for light bulbs. It is anticipated that in the absence of more detailed information, consumers will decide based on price. However, when they receive more information, I expect them to choose the light bulb based on what characteristic they perceive to be most important, as well as comparisons and ratings provided by *Consumer Reports*. The findings will assist in the communication of pertinent product information and creation of a more consumer friendly market environment for light bulb purchases.

The Characterization of Long Flagella 4 Protein in *Tetrahymena*

Stephen Bocarro

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Cilia are microtubule-rich projections that determine a wide range of functions. Previous studies done in the flagellate *Chlamydomonas reinhardtii* identified LF4 (long flagella protein 4), a MAP kinase-like protein, as a negative regulator of cilia length. When overexpressed in growing *Tetrahymena thermophila*, GFP-tagged LF4 induced shortening of cilia associated with cell paralysis and arrest in cytokinesis (likely secondary to loss of cell motility). The phenotype of GFP-LF4 overproducing cells resembled that of mutants lacking the intraflagellar transport pathway (IFT), a pathway that operates within cilia and is required for ciliary assembly and turnover of ciliary proteins. This indicates that LF4 acts as an inhibitor of ciliary elongation and potentially an inhibitor of IFT. When GFP-LF4-overexpressed *Tetrahymena* were starved, the cilia showed paralysis but did not shorten. This suggests that in starved cells LF4 inhibits delivery of essential motility components, such as dynein arms. The paralysis phenotype may result from a higher turnover rate of dynein motors and relatively slow turnover of components required for ciliary elongation such as tubulin. Thus, LF4 could be a negative

regulator of IFT, and its role in ciliary length regulation could be indirect due to its inhibition of IFT. Our goal now is to identify the specific protein(s) that is a substrate of phosphorylation by LF4. We will look for proteins that bind to LF4 using immunoprecipitation.

Outward Migration and the Kenyan Economy: Transforming the Brain Drain to a Brain Gain

Rachel Bonds

Dr. Jack Houston, Jr., Agricultural & Applied Economics, College of Agriculture & Environmental Sciences

The brain drain is a common phenomenon throughout the developing world, with Kenya sending some of the highest numbers of migrants from sub-Saharan Africa. Based on the assumption that the outward migration of Kenyan professionals will continue, this study will answer the following question: How can governments utilize the brain drain to maximize its economic benefits? Remittances are the most visible benefit of outward migration, representing an important source of foreign exchange, but additional benefits, such as an increased network of business professionals, also assist developing countries. This study will first identify these benefits with existing literature and economic modeling. Second, it will address policies that the government and the private sector can adopt to harness the positive externalities of the brain drain by examining the success of other developing countries' policies. Examples of potential findings include increased access and financing for higher educational research, the use of remittances to invest in education and business creation, and the utilization of the Kenyan diaspora to help finance development projects and raise awareness of domestic issues. This study is unique in economic policy and migration literature because it assumes the brain drain is a constant economic reality in the developing world. Using this assumption, this research

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will make important advances on how the brain drain can be used to facilitate development in the sending country. Thus, it represents a departure from traditional brain drain research that focuses on how to inhibit the migration of professionals.

The New Western: Classical Genre Cinema in the 21st Century

Brendan Boyle

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The production of high-profile films in the Western genre has slowed dramatically since its classical period, from the 1940s to the early 1960s. Subsequent Hollywood-produced Westerns demonstrated strong revisionist tendencies and a critical attitude toward classical trends. Close viewings of several Westerns released in the last ten years, however, reveal a marked resurgence of interest in visuals and narratives which not only reference, but celebrate, the classical Western period. Additionally, a less conventional Western, Meek's Cutoff, turns a critical eye toward the cynical gender theory of the title character. These "New Westerns," viewed as a small, distinct group and removed from the glut of films released during the genre's Golden Age, demonstrate a reversal of revisionist attitudes in both mainstream and independent cinema. In particular, Meek's Cutoff, widely considered a "slow" and challenging art film, provokes with its dramatic breakdown of the Western form a consideration of the lingering potential of this neglected genre. The existence and box office success of more mainstream New Westerns prove these implications to be far more than idle musings or misplaced nostalgia.

Correlations Between Ankle Laxity and Dynamic Postural Stability

Jenny Brickman

Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Ankle sprains are the most common injury in collegiate athletics, and approximately 40-70% of those who sprain their ankle will develop chronic ankle instability (CAI). CAI is defined as developing repetitive sprains and persistent symptoms after initial ankle sprain, and may be perpetuated secondary to laxity of the lateral ankle ligaments. Our objective was to determine if mechanical laxity secondary to sprain contributes negatively to dynamic postural stability. Twenty-three volunteer recreational athletes with a variable ankle injury history completed a jump landing task and had their ankle laxity quantified. Participants performed jump landings at 50% of their maximum jump height, and the dynamic postural stability index (DPSI) was used to quantify an individual's ability to maintain balance while transitioning from a dynamic moving state to a static standing state. Its four components include indices in the anterior-posterior (APSI), medial-lateral (MLSI), and vertical (VSI) directions. Higher scores indicated decreased dynamic postural stability. The Ligmaster instrumented arthrometer was used to measure ankle ligament laxity by measuring joint displacement to 150dN. Pearson bivariate correlation coefficients were calculated between DPSI indices and joint displacement. Composite DPSI was moderately significantly correlated to joint displacement ($r = 0.46$; $p < 0.001$). However, the directional dynamic balance indices, APSI, VSI, and MLSI were not significantly correlated with displacement. As laxity increases, so does composite DPSI, indicating that the ability to balance decreases. Increased laxity may play a role in development and perpetuation of CAI and may need to be addressed during rehabilitation to prevent later injury.

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Insertion of Hemagglutinin Gene from H5N1 into Parainfluenza Virus Type 5 (PIV5) Offers Immunity in Mice Against H5N1 Challenge

Kathryn Briggs

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Parainfluenza virus type 5 (PIV5) is a non-segmented, negative strand RNA virus in the Paramyxoviridae family. With few cytopathic effects on the host cell, PIV5 infects many cells types and lacks a DNA phase (excluding the possibility for viral gene insertion into the host genome). Importantly, while it is able to infect humans, it does not induce any known illness. To discern the viability of PIV5 as a vaccine vector, the hemagglutinin (HA) gene from highly pathogenic avian influenza virus (HPAIV) H5N1 was inserted into the PIV5 virion at various locations, taking advantage of the gradient of gene expression observed in paramyxoviruses. In the “base model” construct (ZL48), the transgene was inserted between the hemagglutinin-neuraminidase (HN) gene and the large (L) polymerase gene of PIV5. In the ZL46 construct, it was inserted closer to the leader sequence between the small hydrophobic (SH) gene and the HN gene. In the ZL47 construct, the transgene was inserted even further upstream between the V/P gene and membrane protein (M) gene. Insertion of the HA protein into PIV5 does not appear to increase virulence in mice and induces a robust immune response against influenza virus. The capacity for rPIV5-H5 as a live vaccine was examined in 6-8-week-old BALB/c mice, comparing the levels of transgene expression and assessing the dose required to elicit protection against HPAIV H5N1 challenge. Because gene expression in paramyxoviruses decreases in relation to proximity to the leader sequence, we expect the ZL47 construct to offer the best protection.

Black Stereotypes in Reality Television and the Reinforcement of Prejudiced Attitudes

Melissa Brown, CURO Summer Fellow, CURO Scholar Graduation Distinction

Dr. Kecia Thomas, Psychology, Franklin College of Arts & Sciences

Three studies examined depictions of Black Americans in reality television and factors that influence whether White Americans perceive these depictions as realistic. In Study 1, independent raters content analyzed reality dating shows. Depictions of Black Americans included invisibility, tokenism, stereotypical typecasting, and over-representation/idealization of the minority. In Study 2, 283 White undergraduate students viewed clips from four different shows before completing surveys of racial attitudes, interracial contact, and reality television show perceived realism. Afterward, they indicated their interest in engaging in interracial contact. Results indicated that shows depicting tokenism reduced a willingness to engage in interracial contact. Additionally, individuals who reported low interracial contact were more likely to perceive negative stereotypical images of Black Americans as true to life and support an anti-Affirmative Action petition. Stereotypical depictions of Black Americans viewed as “reality television” may fuel a self-perpetuating cycle of prejudice, stereotyping, and racial segregation that greater real-world interracial contact might counteract. Implications for stereotype maintenance, prejudice reduction, and the impact of television media on racial minorities are discussed.

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Giving Voice to Silence: Theatre and Community in *He Said, She Said, Zhe Said: Gender Stories*

Tyler Bugg

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Franklin College of Arts & Sciences

Community-based theatre is a field of arts practice in which theatre artists collaborate with people whose lives directly inform the subject matter to create collective meaning and heightened social dialogue about a social problem. This research explores the techniques of community-based theatre in the University of Georgia campus production of *He Said, She Said, Zhe Said: Gender Stories*. The production, authored and performed by the students of the university's Fall 2011 THEA4800 class, of which I was part, conducted surveys of scholarly writings and primary fieldwork in exploring issues surrounding themes of gender and sexuality. The research and fieldwork were then directly used in imagining, devising, and scripting stage scenes that responded to the discoveries within the research and fieldwork and employed community-based theatre techniques in communicating them to an audience. Now post-performance, this presentation aims (1) investigate how my particular research and fieldwork was transformed into a meticulously constructed scene entitled "26 Tellings: Rape on Repeat," (2) how it evolved within the context of the production's other pieces and broader message, and (3) based on observations from a post-show audience talk back, how the scene and its message were received by an audience. As a medium for dialogue and social and political engagement, the community-based theatre tactics used in the production represent a powerful method for facilitating a broader dialogue committed to social change on campus, in the surrounding community, and ultimately across the world.

'All Truth is Bitter': Legacies of a Post-Apartheid, Post-TRC South Africa

Tyler Bugg

Dr. Stacey Mitchell, International Affairs,
School of Public & International Affairs

Early twentieth-century apartheid South Africa, defined by a systematic control of race relations in the hands of the intellectual and political elite, evolved into the darkest blot on the history of South Africa's reputation. Although the institutions of apartheid were abolished in the early 1990s, the legacy of apartheid continues to pervade political, economic, and cultural life in South Africa. This presentation seeks to examine how the ideologies that validated apartheid have been replicated in contemporary South African society, stunting the objectives of the country's Truth and Reconciliation Commission (TRC) in normalizing a post-racial, post-conflict society. The research takes a multi-sourced approach: surveys of scholarly writings addressing apartheid's long-term effects, collections of popular fiction, poetry, and media portrayals of apartheid, and primary court and victim testimony shed new light on the conditions of inequality at the center of apartheid, conditions that continue to divide a country along racial, ethnic, and socioeconomic lines. Analysis of each indicates that crime, rape, and assault rates are still among the world's highest; the government's deceptively progressive constitutional reforms are largely unseen; and poorly funded education and agricultural systems are largely ineffective and unequal. The resulting culture of inequality perpetuates the same rhetoric and ideology that sustained systems of apartheid for decades. In understanding the factors that made apartheid a force of power just a few decades ago, the hope for continuing to correct past wrongs and forge progress can be more positively and thoroughly fulfilled.

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Anesthetic Complications in Dogs Undergoing Surgery for Liver Disease

Brigid Burns

Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Liver disease affects several body functions of an animal that are important to consider from an anesthetic standpoint. A dog with ongoing gallbladder issues, such as cholecystitis (inflammation), rupture, or cholelithiasis (stones) associated with disease may undergo a cholecystectomy, in which the gallbladder is completely removed. Clinical experience has shown that patients with gallbladder disease have a higher risk of anesthesia complications, including a noticeable drop in blood pressure. This retrospective case-control study compared surgical records of dogs of similar breed, age, and weight that underwent liver surgery at the Small Animal Teaching Hospital at the University of Georgia to determine different rates of anesthesia complications between dogs that have their gallbladders removed and dogs that do not. Our hypothesis was that dogs that have their gallbladders removed would have a higher rate of anesthesia complications than those that do not. In order to detect possible correlation between cholecystectomies and anesthesia complications, we analyzed certain anesthesia-related variables in the hospital medical records. If there is any association upon completion of this study, in the future, anesthetists may be able to better predict any complications that may arise during liver or gallbladder-related procedures and develop a more efficient plan of action before the time of surgery. This study will also help the veterinary community better understand the role of the gallbladder and the effects of its removal in the dog.

Comparative Genomics of Ribosomal RNAs in Malaria Parasites

Allyson Byrd

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Ubiquitous to all life, ribosomal RNAs (rRNAs) are components of protein-synthesizing ribosomes. In previously studied eukaryotic genomes, genes encoding rRNAs are distributed in multiple high-copy tandem arrays, each of which can contain dozens of copies of the rRNA three gene cassette (18s, 5.8s, and 28s). Genome sequences from the parasitic genus *Plasmodium*, the causative agents of malaria, are atypical, differing in the copy number and organization of rRNA genes. There are only 4-8 non-tandem gene cassettes per genome. *Plasmodium* species are also unique in having divergent rRNA genes that are differentially expressed during parasite developmental stages. The evolutionary history and genome biology of rRNAs within the *Plasmodia* have historically been under-investigated. I have used computational methods to investigate rRNAs from the sequenced genomes of the human-infecting *P. falciparum*, *P. knowlesi*, and *P. vivax*, and the rodent-infecting *P. berghei* and *P. chabaudi*. I have mined sequence, expression, and synteny data to identify full-length and partial rRNA genes in each genome. Curated genes were used to compare and contrast rRNA complements, distributions, secondary structures, and evolutionary histories within and between species, providing novel information on *Plasmodium* rRNA biology. Eventually, a better understanding of the nuances of *Plasmodium* rRNA biology and their role in parasite development may aid in determining their potential as antimalarial targets.

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The Role of Coagulation in Cerebral Malaria in the Mouse Model

Kelsey Campolong

Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Malaria caused by *Plasmodium falciparum* continues to be a major health concern, with nearly one million fatalities yearly. In severe manifestations, parasites adhere to the cerebral blood vessels. This condition is called cerebral malaria (CM) and typically occurs in children under five years. Although full recovery is possible, many patients die, and about one in four CM survivors suffers from long-term cognitive deficits. The development of CM is not well understood since it is difficult to study in humans; however, *Plasmodium berghei* ANKA infection in laboratory mice parallels the human disease. Coagulation in cerebral blood vessels is one mechanism thought to be involved in CM development. This study investigates the role of tissue factor, the protein that activates the coagulation cascade, in disease pathogenesis. Experimental mice genetically modified to lack mouse tissue factor (TF) and express 1% of the normal level of human tissue factor (low TF mice) were paired with control TF-intact mice. Following infection with *P. berghei* ANKA, mice were evaluated daily with behavioral and neurological tests. Test results indicating development of CM triggered immediate euthanasia. Non-CM mice were euthanized after twelve days. A total of 15 mice were infected: seven low-TF mice and eight control mice. Ten of the infected mice developed cerebral malaria by day six post-infection. Of the remaining five, three expressed low levels of TF. This preliminary data demonstrates that reduced levels of TF may offer protection against CM, but further experimentation is necessary.

Arterial Flow Pattern in People with Peripheral Arterial Disease

Neal Canlas,

Michael Theobald

Dr. Kevin McCully, Kinesiology, College of Education

Peripheral arterial disease (PAD) is a major form of vascular disease that contributes to poor health and a lower quality of life. A limitation to treating PAD is the imprecision of current detection methods. Previous studies have reported greater turbulence and velocity as well as a slower time course of reactive hyperemia. The current study analyzed the data from a previous study (6 subjects with PAD and 14 without PAD) and had two aims: 1) compare analyses of flow velocity data between a custom-written MATLAB program and the built-in ultrasound analysis program; 2) investigate the relationship between time course of reactive hyperemia as analyzed by the custom-written program and PAD severity measured with Ankle Brachial Index (ABI) test. A strong correlation was found between the two analysis programs when examining the time to peak ($R^2 = 0.99$) and time to half-returned velocity ($R^2 = 0.94$) in the femoral artery, suggesting that the custom-written program is a valid analysis technique. A moderate correlation was observed for both ABI compared to time to half-returned ($R^2 = 0.4$) and time to peak velocity ($R^2 = 0.6$), suggesting that time course of reactive hyperemia is a potential indicator of the disease severity. Subjects with a wider range of PAD severity will be needed to further confirm the correlation between the time course of reactive hyperemia and PAD severity.

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Mating Regulates Germ Line Stem Cell Division Frequency in Testes of *Drosophila melanogaster*

Vinay Choksi

Dr. Cordula Schulz, Cellular Biology, Franklin College of Arts & Sciences

The replenishment of cells, such as skin cells, depends on the activity of stem cells. How stem cells divide to respond to the demand for specialized cells is not well understood. To explore this question, we use the model organism *Drosophila melanogaster*. In *Drosophila* testes, sperm cells are reproduced from germline stem cells (GSCs). To investigate if GSCs respond to the demand for sperm, we exposed males to females and control males and found that males have a significant increase in GSC division frequency in the presence of females compared to males. To explore possible pathways regulating this response, we investigated the effect of cuticular hormones on GSC division frequency. Cuticular hormones are signaling molecules that act as cues for mate choice. *Drosophila* males exposed to female cuticular hormones displayed an increase in GSC division frequency compared to males exposed to male cuticular hormones. We conclude that the presence of females induces a pathway that regulates SC division frequency in response to mating. Next we asked if mating leads to an increase in GSC division frequency. Mating behavior depends on the activation of specific neurons called fruitless neurons. Male fruitless mutants are not able to differentiate between sexes and attempt mating both sexes. Fruitless mutants also displayed an increase in GSC division frequency, suggesting that these neurons are part of the regulatory circuit for the response of the GSC to mating. The future direction of these experiments is to deduce the biological pathway that leads to GSC division.

Algae Biofuel Development: Growth Efficiency

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The government has officially made the call for biofuels to replace traditional gasoline fuels. The Energy Independence and Security Act, passed in 2009, calls for “32 billion gallons of biofuels to be produced per year by 2022.” Many of the traditional biofuel sources are either not efficient enough (energy density and productivity are too low) or would require too much of the U.S. cropland to be effective, Algae biomass is an attractive source for biofuels that concurrently satisfies both of those requirements. Previous work has shown that the biochemical stimulant *Naphthalene Acetic-Acid* (NAA) can cause the algae to grow at higher productivities and with more lipid content than when grown without the biochemical stimulant. My research sought to determine whether microalgae grow more effectively if that stimulant is administered as a single dose on a particular non-starting day of the 10-day cycle or as smaller doses spread over a period of time within the growth cycle. Across five different species (*Cso*, *Av*, *Ns*, *Db*, *Sb*) it was determined that adding *NAA* on a day other than day 0 (depending on the type of algae) produced the best increase in growth. Each species also concluded their cycles with an overall lipid content higher than that of the control. An average productivity increase of nearly 25% for all samples can be obtained with an additional cost of only \$1.20/gram of stimulant (price of stimulant may vary depending on vendor).

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Racial Inclusivity and Exclusivity in HBO's *True Blood*: A Viewer-Response Critique via Hans Robert Jauss's "Horizon of Expectations"

Elizabeth Crowley

Dr. Michelle Ballif, English, Franklin College of Arts & Sciences

In recent years, vampire fiction has swept the main stage of popular culture. Works like *Twilight* and *The Vampire Diaries* have embraced this trope, as *Dracula* did years before. Alan Ball's television series *True Blood*, though, is quite different from the other, largely simple, contemporary vampiric narratives. Although some critical work has been done on the series, especially in reference to LGBT parallels, no scholarship has yet examined how the show treats the two complex and opposing planes of humanity and supernaturalness. The human plane parallels a current colorblind ideology of complete inclusivity, while the supernatural one parallels historical periods of complete disenfranchisement—pre-Civil Rights America, the Holocaust, etc. The purpose of this study is to examine how the viewer uses this duality to interpret the series as a whole. Using Hans Robert Jauss's theory of reader response—"horizon of expectations"—I explore how these historical and contemporary references influence a viewer's interpretation. Ultimately, this thought experiment demonstrates a viewer's response to the human plane as an identification of the impracticality of a completely colorblind world and to the supernatural plane as an identification of the injustice of discrimination. The result of combining both interpretations is that the viewer paradoxically discerns a fictional/human plane and a non-fictional/supernatural one. This understanding revitalizes Jauss's theory, explains the complexities of *True Blood*, and encourages similar studies on other popular media outlets.

Proteomic Analysis of the Tomato/*Botrytis cinerea* Interaction

Dervin Cunningham, Jr., CURO Honors Scholar, CURO Summer Fellow

Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Botrytis cinerea attributes to the post-harvest rot of more than 200 species of fruit and vegetables. As these produce ripen, their cellular wall drastically degrades, making them more susceptible to pathogens. Significant protein-protein interactions occur between the necrotrophic fungal pathogen, *Botrytis cinerea* (*B. cinerea*), and the tomato fruit. By describing host and pathogen proteomes simultaneously in infected tissues, the plant proteins that provide resistance and allow susceptibility and the pathogen proteins that promote colonization and facilitate quiescence can be identified. This study aimed to characterize the fruit and fungal proteins occurring in the *B. cinerea*/tomato interaction using shotgun proteomics. Mature green, red ripe, wild type, and *rin* and *nor* mutant tomato fruit were infected with *B. cinerea* B05.10. After 5 days the infected tomatoes were gently agitated in a 1.5M NaCl solution followed by a SDS and heat treatment to collect solubilized proteins. The collected proteins were separated on a one dimensional SDS-PAGE gel, followed by in-gel digestion. Peptides were then analyzed by LC-MS/MS on a linear ion trap mass spectrometer. Data was searched using Mascot algorithm. Proteins were identified by combining the *B. cinerea* B05.10 (Broad Institute, MA), and T4 databases (Genoscope, France) with a tomato protein database (SOL Genomics Network, Cornell University, NY). A decoy database was constructed by reversing the sequences in this target database. Statistically significant proteins were determined at a 1% protein FDR. The composition of the collected proteins populations and their putative functions allow for a better understanding of

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the plant-pathogen interaction mechanism.

A Therapeutic Nanoparticle Platform for Targeting Mitochondrial Superoxide

Kasey Darley

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Mitochondrial superoxide (O₂⁻) has been implicated in the pathogenesis of human diseases including aging. It is important for the development of oxidative stress, and antioxidant strategies specifically targeting this organelle could have therapeutic benefits. One challenge of therapeutics targeting mitochondrial dysfunction is distributing drugs to the organelle. Commonly used antioxidants have proven ineffective in clinical trials because these agents are not adequately delivered to the mitochondria. Emerging insights into the molecular pathogenesis of aging suggest that inflammatory processes promote aging. We postulated that mitochondrial targeting of superoxide scavenging would have possible effects such as anti-aging, and the development of organelle-targeted delivery of antioxidants combined with anti-inflammatory agents could incite new therapeutic approaches to the anti-aging of cells. We speculated that a nanoparticle platform based on functionalized polymers could be beneficial for mitochondria-targeted anti-aging strategies. The biodegradable polymer poly (lactic-co-glycolic acid) (PLGA) is capable of encapsulating small- and macro-molecular payloads with a wide range of physicochemical properties, releasing them in a regulated manner. Polyethylene glycol (PEG) is a biocompatible polymer that promotes long-circulating nanoparticles and is used to create biodegradable PLGA-*b*-PEG copolymers possessing terminal lipophilic ligands, which can cross into the mitochondrial matrix space. These polymers will be blended to nanoparticles encapsulating combinations of antioxidants and anti-inflammatory agents by mixing targeting

ligand-functionalized polymer with PLGA-*b*-PEG-OH. By combining controlled release polymer technology and targeted delivery approaches, we aim to deliver antioxidants to the mitochondria of cells along with anti-inflammatory agents in a regulated manner resulting in a more effective management of aging.

An Alternative Perspective?: Dora Mayer's Contributions to the Peruvian *Indigenismo* Movement

Ruth Davis

Dr. Oscar Chamosa, History, Franklin College of Arts & Sciences

The Peruvian *indigenismo* movement, spanning roughly from the 1880s until the 1950s, centered on the social and economic empowerment of the Peruvian indigenous peoples. During the 1920s and 1930s, under the influence of Marxists such as José Carlos Mariátegui and the often subversive rhetoric of Luis Eduardo Valcarcel, two of the most influential *indigenistas* during this period, participants in this movement acquired a particularly revolutionary character. In contrast, Dora Mayer de Zulen, one of the co-founders of the *Asociación Pro-Indígena* [The Pro-Indigenous Association] and a contemporary of these *indigenistas*, rejected revolution and condemned Marxism as another example of Western hegemony and instead opted for a more legalistic approach to socially uplift indigenous Peruvians. However, Mayer's writing was not limited to discussion on the plight of the indigenous peoples but also explored national and international intellectual currents, international policy, the World Wars, the War of the Pacific, and workers' rights. Nevertheless, while she was certainly a prolific writer and an active agent for national and international change, Mayer's contribution to the *indigenismo* movement was and has remained largely underappreciated. I am interested in examining how her marginalized position within the intellectual field of *indigenismo* interacts with the

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expression of her ideas by comparing her nationalistic ideologies and opinions on the revival of the indigenous peoples of Peru to those of her contemporaries. Particularly, I am curious to explore how her position as a female, an immigrant, and a *limeña* [Limenean] seem to motivate these differences.

Do Mushroom-Feeding *Drosophila* Self-Medicating with Alpha-Amanitin in Response to Nematode Parasitism?

Catherine Debban, CURO Scholar
Graduation Distinction

Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

Behavioral adaptations to parasites form an important component of host-parasite interactions. Self-medication is a behavioral adaptation in which animals change their feeding preferences in response to parasitism, resulting in decreased parasite virulence or transmission. Since mushroom-feeding *Drosophila* can tolerate the usually deadly toxin alpha-amanitin, but their *Howardula* nematode parasites cannot, I tested whether these flies might use the toxin to self-medicate in response to infection with nematodes. In this study, I used *Drosophila putrida* and *Howardula aoronymphium* to explore whether alpha-amanitin cures flies infected by *Howardula*, whether alpha-amanitin harms uninfected flies, and whether infected flies have an increased preference for alpha-amanitin. In addition, I tested whether flies from populations inside and outside the range of the nematodes have different toxin preferences. Considering the results of this study, it is unlikely that the flies self-medicate using alpha-amanitin. However, since there is some difference between the toxin preferences of flies from inside and outside the range of nematodes, it is possible that the flies somehow use the mushrooms to protect their offspring from nematode infection.

The Responsiveness of Mothers in Organic and Inorganic Nutrition in Ghanaian Children and the Social and Economic Implications

Tanya Dieumegarde

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The objective of this study was to assess mothers' perceptions of the causes of their child's malnutrition and thus their responsiveness to the child's condition. This was a qualitative, cross-sectional study. In-depth interviews were conducted with mothers of children diagnosed with organic ($n = 2$) and inorganic ($n = 6$) malnutrition, as well as reviewing their medical chart for data extraction in the only children's hospital in Ghana. This was done in concurrence with the nutritional rehabilitation program of the Nutrition Rehabilitation Clinic. Of the eight mothers with malnourished children observed and interviewed, only one correctly attributed poor nutrition as the cause of malnutrition and admittance to the hospital, while the remaining seven did not have any idea of the role of nutrition. Overall, mothers of the organic cases were more responsive to the nutritional care of their child at the clinic, while some of the mothers of the inorganic cases withheld the PlumpyNut supplied by the clinic. This observation was consistent with the rate of recovery of the two organic cases compared to their inorganic counterparts, according to their respective medical charts. Our observation and interaction with the mothers suggested a lack of nutrition knowledge and awareness in child feeding. There is therefore a need for nutrition education in the area of child feeding in resource-poor areas and a rehabilitation program that strictly requires mothers' involvement.

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The Role of Galacturonosyltransferase in the Acetylation and Methylation of Homogalacturonan During Pectin Biosynthesis

Alexandra Dodd

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Homogalacturonan (HG) is an essential glycan domain in plant cell wall pectic polysaccharides. This project explored the range of enzymes activities that modify HG during synthesis, specifically, the addition of acetyl and methyl groups. Labeled HG oligosaccharides (oligogalacturonides, OGAs) were created by reaction with fluorescent 2-amino-benzamide. The resulting 2-AB-OGA was incubated with UDP-GalA and galacturonosyltransferase (GalAT) present in an SP-Sepharose purified solubilized membrane fraction from Arabidopsis suspension cultured cells which contains the GAUT1:GAUT7 GalAT complex. The fluorescently labeled-OGA was used as substrate to detect HG methylation and acetylation activity. Fluorescently labeled OGAs were incubated with crude microsomal membrane fractions, SP-Sepharose purified GAUTs, and GAUT1/GAUT7 complexes immunoprecipitated using monoclonal antibodies against either GAUT1 or GAUT7. Small scale reactions were used to verify enzymatic activity by polyacrylamide gel electrophoresis (OGA-PAGE), and large scale reactions were carried out with verified enzymes. The resulting product was eluted through a size-exclusion chromatography column and analyzed using thin-layer chromatography. Analysis by matrix-assisted laser desorption/ionization mass spectroscopy revealed the size of the labeled OGAs and the presence of acetyl groups, providing evidence for acetylation by native enzymes during HG production. Up to eight GalA residues with four acetylations have been observed thus far. Ultimately, our goal is to determine whether GalA addition is concurrent with the

acetylation or methylation steps in HG biosynthesis. Knowledge about the enzymatic activity that builds pectic polysaccharides as well as other plant cell wall polymers may provide information needed to support the development of a sustainable bioenergy economy.

The Sweet Connection: O-linked β -N-Acetylglucosamine Transferase and Cancer Stem Cells

Sarah-Bianca Dolisca

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There is increasing evidence that a variety of cancers are initiated and maintained by a small proportion of cells called cancer stem cells (CSCs). Recent results from our lab show that deletion of GnT-V, which catalyzes a specific modification of N-glycans with $\beta(1,6)$ branching, reduced the size of the compartment of CSCs in the her-2 mouse model, consequently leading to inhibition of tumor onset. O-linked β -N-Acetylglucosamine Transferase (OGT) is an enzyme that catalyzes the transfer of O-linked β -N-Acetylglucosamine (O-GlcNAc) from Uridine Diphosphate N-Acetylglucosamine (UDP-GlcNAc) to serine and threonine residues of target proteins. OGT is upregulated in metastatic cancer cells in a highly context-dependent manner that may serve as a mechanism that enables tumorigenesis. The notable characteristic of cancer phenotype further supports the hypothesis of OGT's involvement in oncogenesis because the switch from oxidative phosphorylation to glycolytic pathway at the cellular level produces an increase in the necessary intermediates for the hexosamine biosynthetic pathway (HBP). HBP increases the amount of O-GlcNAc, an intermediate that induces the activity of OGT. In the present study, small interfering RNA is used to reduce OGT gene expression in colorectal and mammary cell lines. A series of comparative experiments will be conducted

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on the control and cancerous cell lines to support the working hypothesis that downregulation of OGT will decrease the metastatic properties of cancerous cells by regulating the population of CSCs and ultimately bring insight about the link between OGT activity and CSCs maturation and proliferation.

Increasing Access to Primary Care for Low-Income Rural Georgians

Allison Doyle

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A lack of primary care infrastructure and accessibility to affordable health care is a leading cause of adverse health outcomes in rural areas nationwide. In rural Georgia counties, this lack of infrastructure impedes access for all rural Georgians but most acutely for low-income, uninsured and underinsured Georgians, who have even more limited health care options. Rural Georgia counties have higher rates of chronic diseases and uninsured patients. They also have substantially higher rates of hospital emergency room usage by the uninsured than in metropolitan counties, indicating a lack of options in seeking health care. This paper examines three policy alternatives that Georgia state and local health care authorities can pursue to increase accessibility to health care in rural counties through the augmented use of federally qualified health centers (FQHCs). As they must provide health care services regardless of ability to pay, FQHCs are an optimal mechanism for providing high-quality health care to low-income populations and are heavily invested in by the Affordable Care Act. The effectiveness of the policy alternatives are evaluated through an analysis of health outcomes in several case studies according to four criteria: cost of policy implementation, increased quality of care provided, increased accessibility to health care, and political feasibility. The analysis indicates that when rural FQHCs and local

rural hospitals pursue a policy of collaboration, they can provide expanded health care accessibility to the underserved in rural communities while strengthening their vital role in the rural primary care safety net.

Effect of Anesthetic Variables on Recovery Time in Dogs

Katrina Egan

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Knowing the most efficient route to recovery is important because not only does it help the aesthetician, it can reduce the amount of postoperative morbidity and mortality. The purpose of this retrospective study was to determine all the variables that may be associated with anesthesia recovery and see how they affect the speed of recovery in dogs that were anesthetized with isoflurane, desflurane, or sevoflurane. The hypothesis was that temperature, health status, anesthesia duration, and type of procedure would help predict the best route to recovery. Anesthetic records of dogs treated at the Veterinary Teaching Hospital at the University of Georgia between July 1, 2008 and June 30, 2011 were included in evaluation for this study. Multiple linear regressions using backwards elimination were used to build a model for recovery, using all other measured variables as independent variables. For these data, significance was set at $p < 0.05$. The adjusted R² value indicates how much variance in the dependent parameter is explained by the model. Nine hundred dogs were included in the study. The final model for predicting recovery time had an R² of 0.117 with weight, acepromazine administration, and hypotension being significant predictors for a longer and butorphanol and propofol administration for a shorter recovery time. In conclusion, anesthesia-related variables had a significant but minor effect on recovery time. Only about 12% of recovery time was due to these anesthesia-related variables. This means that

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the other percentage was due to other, unknown variables.

Production of Saccharification Enzymes by Recombinant Fungus Grown on Pectin-Rich Biomass Materials

Abid Fazal, CURO Summer Fellow
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Pectin-rich biomass such as sugar beet pulp (SBP), citrus waste, and apple pomace contain 15-30% pectin, a polymer of galacturonic acid. These materials are viable feedstock sources for alternative fuels, as they are not used for human consumption. In order for these feedstocks to be used, the polymers must be hydrolyzed so that monomeric sugar molecules are released, which the ethanologen can ferment. Commercial enzymes such as pectinase, cellulose, and hemicellulase are required to degrade the plant polymers, which increases the price of industrial ethanol production. Commercially, cellulase and hemicellulases are produced from the ascomycete *Hypocrea jecorina* and pectinase from *Aspergillus* species, as wild type *H. jecorina* produces insufficient amounts of pectinase. Thus, *H. jecorina* Rut-C30 was genetically engineered for the production of pectinase (Pec2) using the microprojectile bombardment method. Upon purification of the recombinant polygalacturonase enzyme (Pec2), the optimal pH and thermal stability was studied by measuring enzyme activity and compared against *A. niger* polygalacturonase (ANP). The recombinant conidia spores were grown in 5L flasks of SBP media containing lactose (as *cel7A* inducer), stabilizers, and other nutrients under saturated oxygen conditions with continual agitation at 28°C. After 7 days of proliferation, the enzyme cocktail was harvested and characterized for the production of a variety of saccharifying enzymes. Under similar conditions of growth, the recombinant strain of *H. jecorina* produced larger amounts of pectinase than its wild type counterpart. Further studies with this

recombinant fungus can help decrease ethanol production costs, making ethanol a more efficient alternative to fossil fuel.

Influence of Different Cell Storage/Culture Conditions on Spontaneous Proliferation and Tyrosine Kinase Receptor Inhibition in Two Feline Injection-Site Sarcoma Cell Lines, In Vitro

Brittany Feldhaeuser
Dr. Robert Gogal, Jr., Anatomy & Radiology, College of Veterinary Medicine

Optimizing cell culture conditions is important when studying cell proliferation and viability, particularly when evaluating response to cytotoxic compounds. Situations can arise in which these cells are stored at less than optimal conditions prior to culture. A change in cell storage conditions can adversely impact proliferation and viability in mortal cell lines. However, little is known regarding the effects on immortal feline cell lines. In the present study, two feline injection-site sarcoma cell lines (KH and Hamilton) were evaluated under standard culture conditions and 3 alternate storage/culture conditions for spontaneous proliferation rate and sensitivity to a novel tyrosine kinase inhibitor, which was assessed by 7-aminoactinomycin D and cytology. Spontaneous proliferation did not differ across various FBS concentrations; however, the standard and delayed techniques showed higher rates of spontaneous proliferation, suggesting a need for prior cell attachment. When normalized to cells untreated with masitinib, the IC50 values for masitinib were comparable across all the different culture techniques. Our preliminary findings suggest that select feline sarcoma cell lines can be subjected to various storage/culture conditions yet yield similar proliferation and cytotoxicity data.

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Identification of GABA-Responsive Neurons in the Zebrafish Brain

Hope Foskey, CURO Honors Scholar
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Over 2 million people in the United States have experienced unprovoked seizure activity or been diagnosed with epilepsy. While medication has been developed that can help some people control their seizures, the mechanism by which seizures occur is not well understood. Zebrafish (*Danio rerio*) is emerging as a vertebrate model in the study of seizure disorders. Seizures in zebrafish can be induced by exposure to the chemoconvulsant pentylenetetrazol (PTZ). PTZ blocks the A and C receptors of the major inhibitory neurotransmitter in the brain, GABA (GABAAR and GABACR). However, the neural circuits by which PTZ propagates seizure activity are unknown. The purpose of my experiments was to identify the neurons likely to be involved in generating PTZ-induced seizure activity. To do this, an adult zebrafish brain was cryosectioned transversely, and GABA-responsive neurons were identified by immunolabeling for GABAAR, GABA, and GAD65/67. GAD is the enzyme that catalyzes the decarboxylation of glutamate to GABA. Additionally, neurons that exhibited high levels of electrical activity during seizure were identified by immunolabeling for *c-fos*, a protein whose expression in neurons is increased when under stress. These experiments identified for the first time the neural pathways in the zebrafish brain that are affected by PTZ and provided insight into the pathways that normally are affected in human seizures.

Segregation in a Modern Age: Systematic Patterns and Consequences

Emily Fountain
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This paper details the history of the

desegregation of Tattnall County, GA, specifically examining the “deliberate speed” with which county schools complied with *Brown v. Board of Education*, as well as the emergence of a local private school and its impact on the local school system in terms of test scores, dropout rates, and graduation rates. A series of interviews with former students and school officials, from the public and private institutions, were conducted, yielding important perspective on history and attitudes, as well as relevant data on graduation rates, dropout rates, and test scores. Additional statistical information was collected from public records. The collected data suggests that desegregation led to the formation of a local private school, which may serve as a persistent form of segregation, especially with regards to class.

Infection Modifies the Effects of Stress on Immune Function in Birds

Melanie Fratto, CURO Summer Fellow
Dr. Vanessa Ezenwa, Odum School of Ecology

A paradox of the immune response to stress is that, under stress, the ratios of phagocytic leukocytes increases, but the ability of blood cells to kill bacteria decreases. In this study, house finches, *Carpodacus mexicanus*, infected with *Mycoplasma gallisepticum* and ones with no obvious infection were captured to study this paradox. This bacterial infection is common among finches and can be spotted by the development of red, swollen eyes. The effect of stress from capturing and holding wild house finches for two hours was assessed by counting white blood cells and running an assay in which plasma is exposed to *E. coli* to measure the innate killing ability of blood. The ratio of heterophils to lymphocytes is an accurate measure of stress and is frequently used in stress studies, and this ratio was compared in pre-stress and post-stress samples from the same bird. The results of this study show that the two hour holding period increased the stress levels of both

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infected and uninfected birds, and that an existing infection alters the effects of stress on immune function. This study will add to the current understanding of how stress affects an animal's immune function and, therefore, risk of infection.

A Portrayal of Power: Black Nationalism in the Documentary *Now is the Time*

JoyEllen Freeman, Foundation Fellow, CURO Honors Scholar, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Barbara McCaskill, English, Franklin College of Arts & Sciences

“Now is the time.” This phrase embodies the impatience that simmered within the black community during the late 1960s. Due to the slow progression towards racial equality and the subsequent emergence of Black Nationalism, many African Americans began to focus less on racial integration and more on racial solidarity as a means of achieving social justice. Hence, various media sources attempted to portray this new mood within the African American community by associating negative images and language with the Black Power Movement. The 1967 documentary *Now is the Time*, however, takes a different approach to Black Nationalism. Using microfilm copies of twentieth-century newspapers such as the *Philadelphia Inquirer* and the *New York Times*, multiple anthologies of African American literature, and scholarly books about Black Nationalism, I have found that *Now is the Time* uses selected works of canonized African American writers to legitimize the Black Power Movement. Although the film fails to include the voices of early African American writers, most likely due to the paucity of available sources, the words of writers such as Paul Laurence Dunbar (1872-1906), James Baldwin (1924-1987), and Langston Hughes (1902-1967) show that resistance and anger have characterized the African American experience since the earliest days of slavery.

Examining *Now is the Time's* normalization of Black Power addresses the conflicting portrayals of this movement in the late twentieth century and simultaneously probes questions about the way in which media sources portray Black Power in the post-Civil Rights Movement era.

The Effect of Protein Kinase Inhibitors on the Growth of *Plasmodium Falciparum*

William French,
Ryan McLynn
Dr. David Peterson, Infectious Diseases,
College of Veterinary Medicine

Malaria is a serious, life-threatening disease that plagues the tropical areas of our planet, causing over 1 million deaths among adults and children annually. While treatments and medicines are available to combat the parasite that causes malaria in humans, *Plasmodium falciparum*, the issue of drug resistance is a dangerous problem in the effort to eradicate this disease. This research project, then, explores the effectiveness of recently developed protein kinase inhibitors on the prevention on *P. falciparum* growth. The project thus far has consisted of tests involving two of these drugs, which were originally developed for cancer therapy, with the hopes of their use in malaria treatment. *P. falciparum* parasites were grown *in vitro* and assessed for growth in micromolar and nanomolar drug concentrations over various time periods. The first drug, Sunitinib (generic name Sutent), is a receptor tyrosine kinase inhibitor and in these low concentrations clearly inhibited parasite growth. The other drug of interest, Akt inhibitor-IV, targets serine-threonine kinases and also demonstrated an ability to inhibit parasite growth at low drug concentrations. The experiments run as a part of this project, once the inhibiting effects of these drugs were observed, suggested an IC50 value for Sutent against *P. falciparum* of around 0.1 uM in a 4% hematocrit solution. The IC50 value for AKt inhibitor-IV appeared to be the same.

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However, the exact mechanism of these drugs is unknown, and further studies are currently underway to determine whether the drugs have a target within the parasite or in the erythrocytes they invade.

Landscapes of the Interior: Ethnobotany and Senses of Place Among Karen Refugees

Terese Gagnon

Dr. Virginia Nazarea, Anthropology, Franklin College of Arts & Sciences

Though few are aware, Athens, Georgia is home to a small community of Burmese political refugees of the Karen ethnic group. Forced to leave their homeland by ongoing government persecution, they continue the process of remembering and reaffirming their cultural traditions while seeking meaning and belonging in their new environment. Through engaging in interviews and gardening practices with the Karen people, I seek to examine the anthropological phenomenon of the 'landscape of the interior,' particularly as experienced from a transnational perspective. Recognizing the value of preserving genetic biodiversity alongside culturally situated knowledge, I will record--through the process of memory banking--ethnobotanical traditions of the Karen and their cultural relationship to the natural environment. With information obtained from interviews I plan to produce a register of Karen plant species, including their characteristics, methods of cultivation, uses, and religious/cultural significance. In order to facilitate the clarity of interviews and build a reciprocal relationship, I will offer participants English language tutoring, focusing particularly on terms related to nature and gardening. My research will culminate in a thesis examining the role of 'interior landscapes' in shaping relationships with a new inhabited environment, an area of cultural anthropology largely understudied. This investigation seeks to benefit the Karen people and the community at large by encouraging the continuation of traditions,

creating a sense of 'rootedness' and preserving ethnobotanical knowledge. I approach this research with the belief that practices of remembrance are often the strongest means of combating forces of oppression.

Access to Primary Care Services in Athens

Smitha Ganeshan, Foundation Fellow
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In Athens-Clarke County, 20% of the population is uninsured and 38% of the population receives Medicaid assistance. This 58% of the population faces severe financial and structural barriers in accessing primary care services. Most of the uninsured and Medicaid patients are seen in Athens Regional Medical Center's and Mercy Health Center's emergency departments, where the cost of care is mostly uncompensated and approximately three times higher than it would be in a primary care setting. Additionally, poor longitudinal care for chronic diseases results in repeated preventable hospitalizations. A thorough literature review was conducted to develop a policy proposal to make Athens-Clarke County more competitive for federal money and assistance through the Patient Protection and Affordable Care Act. After evaluating various policy alternatives based on a cost-benefit analysis, a proposal that calls for Athens to apply for a Health Professional Shortage Area (HPSA) designation was chosen. This designation will ultimately enhance Athens-Clarke County's applications for having a Federally Qualified Health Center (FQHC) and improve low-income patients' access to primary care services in Athens. An integrated health system that provides adequate access to primary care services for low-income patients in Athens-Clarke County would improve community health, reduce health disparities, and reduce health costs.

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The Militarization of U.S. Intelligence?

Alexis Garcia, CURO Honors Scholar
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In his 2012 Defense Strategy Rollout, President Barack Obama declared, "the tide of war is receding." Yet, the U.S. is still spending one-third more on the military than the Cold War peak, and the United States is estimated to have almost 1,000 military bases abroad. It appears as if chief executives believe that the post-9/11 world is more dangerous than ever, brimming with existential threats. As Admiral Stansfield Turner remarks in *Burn Before Reading*, military officials "simply cannot overcome their conviction that the intelligence needed on the battlefield must always have number-one priority" (256). Considering that a large amount of the information the president uses to make foreign policy decisions comes directly from these intelligence leaders, it may be that the information these leaders have provided to the president is greatly influenced by their military backgrounds, which may in turn fuel the nation's concerns over defense issues rather than economic or political issues. In order to test this hypothesis, I will examine the occupational backgrounds of the past directors of the sixteen intelligence communities, as well as the Director of National Intelligence. The methodology of this study will be to use archival records to determine who has led these agencies. Based on this data, the study will contrast the extent to which military or civilian leaders have led the intelligence community. I predict that the project will reveal that a significant number of the nation's intelligence leaders have had military rather than diplomatic backgrounds. Thus, these findings should provide important insights that might help us understand America's large spending on defense.

Teacher Attrition: Possible Policy Solutions

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Avery Wiens
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Teacher attrition is a major problem facing the United States' education system. Almost half of all new teachers will exit the profession within their first five years. Estimates of the costs of continually replacing teachers run in the billions of dollars, and attrition has major implications for the quality of the teaching workforce, as teachers make their largest gains in their teaching ability in the first couple of years. Major solutions to the problem of teacher attrition in the literature include comprehensive induction, salary increases, improvement of pre-service training programs, and changes in working conditions. If a policy of comprehensive induction includes support and mentoring for new primary school teachers, as well as collaboration with the community and departments of education, then primary school teacher attrition rates will decrease. This paper will evaluate these policy alternatives in terms of the cost of implementing the program, the cost savings of the program, the reduction in the attrition rate, and the increase in the quality of the teaching workforce.

The Role of Cysteine Residues in the Function of Ras Converting Enzyme

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Sciences

Rce1p is a protease that is involved in the post-translational modification of Ras. Because of the well-recognized involvement of Ras in cancer biology, Rce1p, a Ras modifier, is considered an anticancer target. Despite its biomedical importance, Rce1p enzymology remains uncertain. Contrary to

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the claim that Rce1p is a cysteine protease, recent investigations have demonstrated that Rce1p lacking all of its native cysteine residues remains functional in vivo. These investigations were performed using yeast Rce1p and a natural substrate, the **a**-factor mating pheromone. Notably, cysteine-less Rce1p is inactive in vitro against a synthetic **a**-factor-based substrate that is significantly shorter than the natural in vivo substrate. This study tests the hypothesis that cysteine residues are not involved in the Rce1p catalytic activity but are instead involved in substrate recognition by Rce1p in a manner that is influenced by substrate length. The ubiquitin fusion technique was used to create shortened **a**-factor substrates in vivo. We used quantitative mating tests to evaluate and quantify the ability of several Rce1p cysteine mutants, including cysteine-less Rce1p, to recognize these shortened substrates, named Ub-P2 and Ub-M, and yield mature **a**-factor. The tests reveal that the substrate recognition of cysteine-less Rce1p is comparable to that of wildtype Rce1p for the Ub-P2 substrate, while its selectivity is severely diminished to approximately ten percent of wildtype in the context of the Ub-M substrate. The results support the hypothesis that cysteine residues are involved in recognition of short substrates by Rce1p and clearly not involved in the catalytic mechanism of Rce1p.

Testing Algorithms to Predict Onset of Cerebral Malaria in Murine Model

Mina Ghobrial

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Malaria is an infectious disease caused by the parasite genus *Plasmodium*, which kills approximately 2.7 million people each year. 20-50% of all malaria cases develop into cerebral malaria (CM), but much of its pathology is not clearly understood. *Plasmodium berghei* ANKA induces CM in mice. Behavioral and neurological symptoms of mice experiencing CM are similar to those

seen in humans. However, incidences of experimental CM are variable. In some experiments, nearly 100% of mice develop CM, yet in others, only 50% develop CM. Lack of understanding which and when infected mice will develop CM contributes to a weak understanding of the relationship between early pathological changes of CM and the resulting outcome. In our experiments, approximately 4-8 mice are infected with *P. berghei* ANKA and evaluated daily for symptoms suggesting the likelihood that they will develop CM. On days 4-7 post-infection, the mice were subjected to a battery of behavioral and neurological tests. Each test produced a numerical score that was inserted into a published algorithm designed to predict the chance that a mouse will develop CM. While the experiments are still underway, it appears that the published algorithm does not universally apply to all experimental conditions and mouse strains. However, assessment of an alternate predictive algorithm is being investigated. Creating an effective and reliable algorithm has a plethora of benefits. For example, it can predict CM development in its early stages and the corresponding approximate time of death. Composed of simple tests and inexpensive materials, the protocol for this algorithm can be reproduced easily. This could be helpful to future research concerning CM in murine models.

Stability Analysis of the Inhibitor Resistant Phenotype of AJP50 in Biomass Fermentations

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The United States' dependence on foreign oil and a desire to protect the environment have increased demand for alternative fuels. Lignocellulosic biomass can be fermented into fuel ethanol by a biocatalytic organism, such as *Saccharomyces cerevisiae*. Adapting *S. cerevisiae* to the harsh conditions found in biomass

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fermentations would increase production. Strain XR122N was adapted by continuous pine fermentation to yield strain AJP50. AJP50 was able to grow and produce ethanol more rapidly than XR122N in pine wood fermentations. To determine if AJP50 retained its inhibitor resistant phenotype, the strain was cultured on YPD media. Growth curves were created to compare the growth of the newly cultured cells to the freezer-stock AJP50. Approximately 62% of the freshly cultured cells maintained the same level of resistance as freezer-stock; at other times they reverted to the parent or an intermediately resistant phenotype, indicating the resistant phenotype is not completely stable. AJP50 cells were grown on YPD plates with a mixture of 13 major inhibitors. Single colonies were subcultured onto fresh plates containing media with all 13 inhibitory compounds. Single colonies from this plate were then grown in liquid YPD with all 13 inhibitors. The cells in the flask were compared to the AJP50 freezer stock. Those that performed similarly were made into freezer stocks to be used in future pine wood fermentations. Developing culture techniques that will allow AJP50 to retain its phenotype would aid in study of the strain's genetics, and allow for the creation of strains with advanced fermentation capabilities.

Drilling for the Future: Domestic Oil Production and Meeting America's Energy Needs

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John Henry Thompson
Dr. Rob McDowell, Public Administration & Policy, School of Public & International Affairs

Since the oil industry boomed in the 1930s, oil has provided the United States with a consistent and reliable fuel source while allowing it to prosper and establish a high quality of life. Oil is a rich natural resource that the United States is fortunate to have in abundance. Unfortunately, environmental

fears blind us to the benefits of this resource that cannot be matched in any other fuel source. The federal government has imposed strict regulations on drilling that limit the areas in which drilling is allowed and rarely allow new permits to be administered, creating an uncertain business environment for oil companies. As a result, the government forgoes \$803 billion in economic growth, \$6 billion in tax revenue, 690,000 jobs and billions of barrels of domestically produced oil. After a thorough literature review of studies conducted by industry experts and a cost benefit analysis, this study proposes easing certain regulations on domestic oil production. Easing regulations would mean opening up the areas currently closed to drilling on the Pacific and Atlantic coasts, in the Gulf of Mexico, and on the Alaskan coast, increasing the rate of permitting, allowing further production of shale gas, and permitting the Keystone XL Pipeline. Several studies have compared the current path of oil production with that of the possible path if this policy were to be enacted, and all have shown tremendous economic benefits. Oil is simply a natural resource that the United States logically should take full advantage of in order to continue to prosper.

The Role of Sensory Systems in *Drosophila* Courtship across Populations

Erin Giglio, CURO Summer Fellow, CURO Scholar Graduation Distinction
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All species of *Drosophila* use distinctive courtship patterns to choose among potential mates. The purpose of this project is to examine the sensory systems used in courtship behavior by two closely-related *Drosophila* species. *D. recens* and *D. subquinaria* are two species which do not mate with one another in the wild but whose geographic ranges partially overlap. It is possible that they avoid intercrossing by using different sensory systems during courtship, such as wing-based

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song, pheromonal smells, or visual displays. To test which of these hypotheses was correct, I performed a series of individual crosses to identify the emphasis on each sensory system within each species. I studied flies from *D. recens* and two populations of *D. subquinaria*—one population living alongside *D. recens*, and one population that does not overlap with *D. recens*. I studied the courtship behavior of flies from each population through observation of mating pairs. Four sensory system losses were assessed through surgical removal of wings, antennae, arista, and through painting over of eyes. Finally, I looked at the sex-based differentiation of these categories by surveying the differences between courtship success with different combinations of intact or altered males with intact or altered females. This measured the importance of these systems on courtship success. I found that olfactory signaling was important to females and that wing status and vision were important to males in almost all populations. I also identified a shift from gustatory to olfactory signaling in males from the sympatric *D. subquinaria* population.

The Uses and Effects of Music in the Conflict in Northern Ireland

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Dr. Jean Kidula, Ethnomusicology, Hugh Hodgson School of Music

For centuries, music has been and remains an integral part of Northern Irish culture. Music is used as an expression of celebration or mourning, as a means of remembrance or protest, and in a variety of cultural functions. Another defining aspect of modern culture in Northern Ireland is the traditional and continuing conflict between Catholics and Protestants. This conflict colors the culture, the politics, and everyday life in Northern Ireland. This thesis seeks to explain the role music, a visceral and emotional force, plays in this conflict in Northern Ireland. The work is based on ethnographic research including

interviews and participant-observation in Northern Ireland, as well as independent historical and musical research. This research informs insights into the culture and music and provides a broad knowledge base on the background of Northern Irish music and the religious and cultural conflict. It is hypothesized that the Northern Irish music related to the conflict will serve specific purposes based on the performers' intentions and the effects on members of the group to which it belongs and the effect on the opposing cultural group. The messages, origins, material associated with them, and locations and situations in which they are performed will likely influence the analyses of songs. These analyses of the songs attempt to determine culture non-specific definitions of the roles of music in conflict. This analysis of the Northern Irish use of music in conflict may be applicable to other cultures in which music plays an important role in conflict.

Genetic Manipulation of *Caldicellulosiruptor bescii* for Biomass Utilization

Philip Grayeski, Foundation Fellow
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Caldicellulosiruptor bescii is a thermophilic anaerobic Gram-positive bacterium that grows optimally at 75°C and is capable of using untreated lignocellulosic biomass for growth. Its substrate range includes xylan, crystalline cellulose, hardwoods, grasses, populus, and switchgrass making it a model system for the study of biomass conversion to biofuels and bioproducts. Our lab recently developed a method for DNA transformation for *C. bescii*. We are using genetics as a tool to investigate its ability to use complex substrates as well as to engineer it to make products of interest. My role in this project has been to improve existing transformation methods and to generate deletions of genes predicted to be involved in plant cell wall deconstruction. We have shown that higher transformation

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efficiencies are obtained by altering medium components, lowering phosphate concentrations, removing sodium sulfide, and using a pre-culture grown to an O.D. of 0.08. We also constructed a plasmid to introduce an extra copy of the cellulose A (CelA) gene, an enzyme important in crystalline cellulose degradation with a His-tag to facilitate protein purification. We have constructed gene deletions on non-replicating plasmids and introduced them into the chromosome by marker replacement. A deletion in a cluster of genes predicted to be important for pectin degradation results in a strain that shows significant growth defect on grasses. We will use constructed deletions to identify genes important for biomass deconstruction. Methods for transformation and marker replacement will be presented.

Management of Marine Debris in the U.S.: A Survey of Options and Database for Decision-Makers

Jenna Grygier

Dr. Jenna Jambeck, Biological & Agricultural Engineering, College of Agriculture & Environmental Sciences

Solid waste (e.g., garbage, trash, litter) that accumulates in the world's waters and shorelines of waterways is known as marine debris. Marine debris is a type of pollution in which land- or sea-based activities discharge waste into the ocean and its shorelines. Debris exists throughout every depth of the ocean and can be found even in the most remote areas. Stormwater runoff, rivers, streams, etc. help transport marine debris onto the land. Marine debris represents a complex problem in which aesthetic, environmental, human and animal health, and safety factors are of concern. The purpose of this research was to investigate and document current waste management programs of various marine debris projects (beach cleanups, etc.) and partnerships in the US. The result is a dataset that can act as a resource for decision makers for land based or open ocean marine

debris projects. The dataset and information will be housed on the Southeast Atlantic Marine Debris Initiative website. Individuals can access this database as a guide for implementing original marine debris waste management projects; data summaries will provide information such as the percentage of marine debris projects that recycled, landfilled, or practiced waste-to-energy methods, including the location, description, contact information, sponsorship information, etc. for each project. This research encourages the development of innovative, potential debris management methods such as gasification and pyrolysis. This research encompasses many fields of study: engineering, environmental science, alternative energy, ecology and chemistry, which all work together to explore the challenging problem of marine debris.

Description and Measurement of Response to Osmotic Stress in *Toxoplasma gondii*

Daniel Guidot

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Toxoplasma gondii is an Apicomplexan parasite that infects any nucleated cell and causes significant morbidity in immunocompromised patients and unborn fetuses. It is a great model parasite because, unlike other Apicomplexans, it is highly amenable to genetic modification. *T. gondii* can infect a wide host range because of robust homeostatic mechanisms, including homeostatic osmoregulation. However, methods are needed to evaluate osmoregulatory mechanisms in *T. gondii*. We observed *T. gondii* parasites of the RH strain using Differential Interference Microscopy videos as they responded to osmotic stresses and observed how these cells react in morphology and size. We additionally observed that cells scatter light in direct correlation to changes in cell size and morphology during hyposmotic stress. Using this approach, we developed a technique to

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show an osmoregulatory defect of a *T. gondii* mutant strain lacking the vacuolar proton pyrophosphatase (TgVP1), an enzyme important for osmotic regulation in plants. We observed a 60% increase in swelling in these mutants compared to parental cells in identical osmotic stress, demonstrating decreased homeostatic osmoregulation. This result shows this technique to be a sensitive and robust method to measure osmoregulatory capacity. TgVP1 localizes to the Plant-Like Vacuole (PLV), an organelle whose function is not fully understood but is so named because it possesses many membrane proteins, like TgVP1, that are found in plant vacuoles. We performed Immunofluorescence Assays on fixed cells at time intervals after exposure to hyposmotic stress and found significant PLV rearrangement. Cells showed apparent PLV fission or possibly the creation of new PLVs in response to stress.

A Piece of the Puzzle: Why People Wear Peace Signs Today

Natalya Haas

Dr. Katalin Medvedev, Textile, Merchandising & Interiors, College of Family & Consumer Sciences

According to the anthropological symbolic theory, dress represents “the relationship of the individual to the cultural system” (Hamilton & Hamilton 141-2). Therefore, wearing the peace sign represents the values and beliefs an individual wants to convey to society. And many people wear peace signs today for the same reasons they did when it first became popular during the Vietnam War – to protest a war that continues against their wishes. To arrive at this conclusion, I researched a number of academic journals, books, and popular sources discussing the peace sign and why its symbolism continues to be so relevant. I discovered that the recent reemergence of the peace sign is linked to the increase in violence-related events around the world and reveals people’s desire for these

conflicts to end. Designers such as Tory Burch (in 2007) and Moschino (in 2010 and 2011, possibly in support of the withdrawal of more U.S. troops) featured peace signs in their collections in the midst of the Iraq War. The increasing number of celebrities that promote peace-related issues has also led more people to wear peace signs. My research concluded that the peace sign conveys the attitude of many people toward present political conflicts around the world and expresses their desire for such conflicts to be resolved without violence.

Limb Morphology and Sequence Divergence in the *fgf* Genes of *Anolis* Lizards

Tyler Haeffs, CURO Scholar Graduation Distinction

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Fibroblast Growth Factors (FGFs) constitute a large family of secreted signaling proteins that are involved in many vital processes in the vertebrate body. In particular, the well-conserved *fgf8*, *fgf10*, and *fgf19* genes encode proteins that tightly regulate limb growth during embryonic development. However, currently it is not known whether changes in the expression levels or activities of these proteins contribute to the evolution of different limb morphologies among species. In order to better understand this connection, sequence divergence for *fgf* genes of interest was compared between closely related species of long and short-limbed *Anolis* lizards, a group of species that possesses a unique combination of repeated adaptive radiations and convergent evolution of similar limb morphologies. Isolation of the *fgf* genes was carried out on cDNA samples of two different *Anolis* species, and sequence analysis was then performed on the isolated fragments to identify divergences in *fgf* gene sequence between the two species. The amino acid sequences of the encoded *fgf* proteins were observed to be nearly identical between the

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different *Anolis* species. Because of this sequence similarity, I speculate that protein divergence in these *fgfs* is unlikely to contribute to the dramatic difference in limb size observed between these species. Future work could examine the expression of these genes to determine whether differences in expression correlate with changes in morphology.

Digital Analysis of Feline Bone Marrow Fat Content

Hannah Hanley

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Diagnosis of malnutrition in animals at postmortem can be difficult and in forensic cases requires objective criteria for legal purposes. Currently, chemical analysis of bone marrow fat is one objective standard for assessing nutritional status. However, alternative methods for quantifying bone marrow fat that do not rely on chemical analysis, such as quantitative microscopic analysis, are needed when fresh marrow is not available. The null hypothesis of this study is that bone marrow fat content determined by chemical analysis differs from fat content determined by microscopic digital imaging. To test this, both femurs were collected from 18 cats submitted to the Athens Veterinary Diagnostic Laboratory for necropsy. One was submitted for analysis of percentage marrow fat using a chemical extraction method. The other was fixed in formalin and hematoxylin, and eosin stained microscopic sections of marrow from head and mid-shaft regions were analyzed for percentage fat via microscopic digital imaging using Adobe Photoshop. Results of the two methods were compared; findings were also compared to body condition scores. Results from the two types of analyses were similar, but the marrow fat percentage from the mid-shaft region as determined by microscopic imaging more closely matched the chemical analysis. The majority of cats had less than 60% femoral fat

content, which is less than normal, based on other domestic species. However, this generalization cannot be made in cats as low fat content did not necessarily correspond to a poor body condition score.

Relationship Between Left Uncinate Fasciculus White Matter Integrity and Verbal Memory

Alexander Hansen

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Processes of higher cognition, such as memory, ostensibly rely on the integrity of anatomical connections in order to function efficiently. Magnetic resonance imaging (MRI) is used to analyze the anatomy of the brain and can elucidate the connectivity of brain regions. Diffusion weighted imaging is an extension of MRI that measures the diffusion of water in tissues. In areas of dense myelination, diffusion parallels the length of the axons. To characterize directional diffusion along myelinated axons, software is used to calculate fractional anisotropy (FA) values, a measure of white matter integrity. Based on FA, white matter fibers can be tracked and rendered graphically, revealing the degree of connectivity between regions of the brain. In this study, we assessed the relationship between the degree of connectivity in the left uncinate fasciculus (UF), a fiber tract said to be involved with verbal memory and verbal memory performance. Diffusion weighted images (encoded in 30 diffusion gradient directions) for 20 participants (ages 8-11) were obtained using a GE 3T MRI scanner. Verbal memory was measured using the California Verbal Learning Test—Children’s Version (CVLT-C). Fibers of the left UF were tracked using ExploreDTI software. Preliminary results indicate that the average FA values of the left UF are correlated with CVLT-C scores. The purpose of this study is to characterize the relationship between FA of the left UF and verbal memory performance. If a relationship

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is found, it may suggest that proper development of this fiber tract is important for efficient memory processing.

Race Relations in Brazil Between 1890 and 1920

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Brazil, the second-to-last country in the Americas to abolish slavery, sees itself as an extensive racial democracy. And at surface level, Brazil projects racial harmony. But analyzing the social constructions present in Brazilian society reveals that this democracy is a fallacy. This work dissects several historical, sociological, and literary texts that clearly demonstrate the precarious relationship between the Brazilian racial hierarchy: those of European, Indigenous, and African descent. In each work, the primacy of whiteness dominates through the subtle characterization of Europeans, while developing stereotypes that adversely affect the African, bi-racial, and indigenous populations. This work analyzes these representations in texts post-abolition until the end of the Old Republic in 1920. Through the historical and literary texts, it is possible to clearly see the steps that Brazil took in its formation and understanding of racial relations into the modern day. Ultimately, Brazilian society during that time utilized white-washing as a tool to eliminate racial hierarchy. Interpreting the literary texts further, it is then possible to understand the multiple, marginalized perspectives and project them as a reflection of Brazilian societal goals.

Analysis of the Legal Needs of Primary Care Physicians

Osama Hashmi, CURO Summer Fellow
Dr. Monica Gaughan, Health Policy & Management, College of Public Health

The American Medical Association has recently defined various legal issues physicians face, ranging from patient confidentiality to malpractice management. As the Patient Protection and Affordable Care Act goes into effect between now and 2014, physicians will need to navigate an even more complex and legal environment. During this time period, policy researchers around the United States will be asked to evaluate alternatives to improve and reform the current policy problems in healthcare delivery. As the legal issues physicians face become a more prominent aspect of physician life and primary care recruitment, this research will be crucial in promoting a better system of healthcare for the United States. My contribution to the study was to employ various policy analysis tools to analyze the legal needs of primary care physicians, and to provide a comprehensive evaluation of the physician payment system, as well as the networks which create our current system. This research also involved travelling to Washington, D.C to work on-site with various groups analyzing the current national health care policy environment, especially as it relates to the primary care labor force.

Residential Electricity Consumption and Affordability of Efficiency and Clean Energy Upgrades

Heather Hatzenbuehler
Dr. Andrew Carswell, Housing & Consumer Economics, College of Family & Consumer Sciences

Fossil fuel-generated electricity is artificially competitive in the energy market, which is excluding competition from renewable energy technologies such as wind, solar, geothermal, and tidal. In the U.S., coal is also the largest

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source of fuel for electricity generation, generating more power than natural gas and oil combined.¹ Coal is the largest contributor to greenhouse gas emissions in the country, and it releases dangerous pollutants such as arsenic, lead, and mercury into the air and water supply. This pollution has significant environmental and human health costs that are not accounted for in the market price of coal-generated power. These economic conditions make household investments in clean energy and efficiency technologies cost-prohibitive for the average consumer. Residential efficiency and clean energy (RECE) upgrades that could reduce energy costs and improve environmental conditions are not feasible for most homeowners. Similarly, most consumers are uninformed about the origin of electricity and ways to conserve power. Through a review of government data, academic studies, and existing policies and outcomes, I have crafted a policy that addresses the barriers to RECE investment in Georgia. It includes a package of tax incentives, financing options, and education to be implemented as a pilot program in Athens-Clarke County.

¹ U.S. Energy Information Administration, U.S. Coal Supply and Demand, 2009 Review, April 2010. Retrieved at <<http://www.eia.doe.gov/cneaf/coal/page/pecial/overview.html>>

Legal Approaches to Addressing Water Pollution Risks Related to "Fracking" in the Marcellus Shale Region

Heather Hatzenbuehler

Dr. Terence J. Centner, Agricultural & Applied Economics, College of Agriculture & Environmental Sciences

Hydraulic fracturing, or “fracking,” is an industrial process used to harvest fossil fuel reserves that lie deep underground. By digging wells and injecting them with large quantities of water mixed with specially selected chemicals at high pressures, the rocks that

store these natural resources are cracked open, allowing their contents to flow to the surface. This process has led to a significant increase in the economic reserves of natural gas in the United States. The once unreachable shale gas is now being piped out by the ton, and natural gas prices in all sectors—commercial, residential, and industrial—are at 5-year lows. However, there is growing concern about evidence of negative environmental impacts from fracking. The potential for water contamination, land destruction, air pollution, and geologic disruption at every step in the process has brought the safety of this extraction method into question. States such as New York, New Jersey, Maryland, and North Carolina have banned fracking until further research and review of environmental and human health impacts are completed. This paper looks specifically at the impacts that these processes have on local water supplies and seeks to identify the best legislative or regulatory approach to mitigating these risks in the Marcellus shale region. Existing state and federal laws, government data, and peer-reviewed academic studies and articles will provide a base of information for analysis and development of policy alternatives. Criterion such as ecological impacts, political feasibility, and operational practicality will establish framework for evaluation and ultimate policy recommendations.

An Affect Control Theory Analysis of Islam and Christianity

Anna Beth Havenar, CURO Honors Scholar, CURO Summer Fellow

Dr. Dawn Robinson, Sociology, Franklin College of Arts & Sciences

While western scholars have studied the languages and cultures of many groups, Arabic linguistic culture remains sorely under-investigated. My research employs semantic analysis of Arabic and English words to examine the role of religion in shaping linguistic culture. Utilizing Affect Control

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Theory, I will analyze the way that sentiments affect other sentiments (impression change). I focus on three universal dimensions of sentiments: evaluation (good to bad), potency (powerful to weak) and activity (lively to quiet). These generalized sentiments are widely shared across a culture, and it is our agreement upon them that allows us to communicate with others. My data is derived from surveys of 500 native English speakers and 470 native Arabic speakers currently residing in North Carolina. These data, collected during the summer of 2010, serve as a pilot study for a new international data collection project to begin in the summer of 2012. I expect to see an emphasis of potency over evaluation in Arabic speakers, perhaps due to the deeply rooted Islamic ideals of shame and honor. Once our data is collected in the U.S. and the Middle East, we can use it in simulation programs to predict the outcome of social actions in various situations. By comparing our results with previous and current English ACT studies, we will be able to explore key differences in American and Arab cultures. This research is funded by the U.S. Naval Academy and will hopefully aid soldiers in their interactions with Arabic-speaking civilians during conflict in the Middle East.

Rastafari: Continuity, Discontinuity, and Present Identity

Paul Havenstein

Dr. Reinaldo Román, History, Franklin College of Arts & Sciences

Despite its global reach, Rastafarianism is one of the most misunderstood religions in the world. Since the 1970s, Rastafarians have grown from a Jamaican peasant cult to a worldwide socio-political, religious, and cultural phenomenon. This transformation has not gone unnoticed, but as UCLA historian Robert A. Hill points out, “there is an urgent need to reintegrate the study of Rastafarians into the dynamic flow of popular social movement in a manner that is sensitive

to both the complex aspects of continuity and discontinuity in the overall historical process.” My thesis is aimed at addressing this need with a study of select Rastafarians groups from around the globe. The object is to determine second-generation communities’ engagement in the Jamaican tradition, and to what extent they represent distinct social movements rooted in new dynamics. The paper will cover the continuities and discontinuities as the religion spread and ask the question of who today is an authentic Rastafari? My work focuses much on the current state of Rastas in Washington, DC and includes in-depth personal interviews with Gary Himelfarb, partly responsible for bringing reggae music to DC, and Dr. Jake Homiak, a leading expert on Rastafari and curator of the “Discovering Rastafari!” exhibit at the Smithsonian. My thesis will clarify how and why the religion transformed from a deviant and sometimes violent cult in Jamaica to a worldwide proclamation of universal love and respect.

Recycling and End-Use Industries in Georgia

Jennifer Hegarty,

Laura Hegarty

Dr. Anne Marie Zimeri, Environmental Health Sciences, College of Public Health

A study by the Georgia Recycling Commission found that 16 Georgia paper mills use recycled content, with 9 of the mills relying exclusively on recycled fiber. Because Georgia does not recycle enough paper to meet production demands, Georgia’s end-use industries are currently buying recycled material from other states, yet they still often do not have enough supplies to keep up with production demands. The GRC study also found that Georgians throw away an estimated 1.9 million tons of paper a year -- paper that could be recycled and purchased by end use markets within the state. Although many Georgians recycle, many more do not because they deem it too inconvenient and

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expensive, and perceive a lack of facilities available to accommodate such recycling. The lack of paper recycling within the state of Georgia causes market failure by way of externalities through pollution and through the limitations it places on the development of Georgia's end-use industries. This policy proposes that Georgia implement a state-wide recycling initiative to increase the volume of paper recycled with the goal of enhancing and increasing the end-use industry within the state, which would in turn stimulate the state's economy. With use of a thorough literature review as well as a cost benefit analysis, alternatives to the status quo will be evaluated on the basis of efficiency, economic growth, political acceptability, the interest of future generations, and improvability. The proposed policy will be the one that stands up best to this evaluation.

Increasing Breastfeeding Rates in Athens-Clarke County

Anisha Hegde, Foundation Fellow
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Breastfeeding is linked to improved child and maternal health. Low breastfeeding rates contribute to poor health outcomes and an estimated \$3.6 billion in superfluous costs to health care providers and patients--markers compounded by the unavailability of breastfeeding support to those in the bottommost social strata. Breastfeeding rates in the U.S. are lower than those in most of the developed world; only 14.8 percent of U.S. mothers breastfeed exclusively for six months. Georgia's breastfeeding rates are amongst the lowest in the U.S. (only 10 percent of Georgian mothers exclusively breastfeed at 6 months). These rates are even lower in Athens-Clarke County, which currently offers sparse and costly or underfunded breastfeeding services through St. Mary's, Athens Regional, and the Supplemental Nutrition Program for Women Infants and Children. To better this status quo, a policy

recommendation to establish a breastfeeding peer counseling program in the two hospitals was constructed through literature reviews, cost-benefit analysis, and interviews with healthcare personnel. By implementing a counseling program in hospitals, targeted at but not limited to mothers living 185 percent or more below the poverty line, an efficient partnership and mutually beneficial relationship amongst patients, hospitals, and Athens-area organizations would be fostered. The program would potentially increase the number of women breastfeeding for one year by 15 percent--likely an underestimate because it is based on numbers from Hartford Hospital, which serves a larger minority, disadvantaged population than do Athens-area hospitals. According to Healthy People Goals, an increase of 15 percent is enough to improve the health of a community by making infants less susceptible to illnesses such as gastroenteritis and reducing risks for diseases such as breast cancer and heart conditions in mothers.

Dietary Resource Partitioning of the Southern Flying Squirrel (*Glaucomys volans*)

Katherine Helmick
Dr. Gary Barrett, Odum School of Ecology

Understanding feeding habits of the Southern flying squirrel, *Glaucomys volans*, is limited to few scientific studies. We investigated dietary preference of *Glaucomys volans* by computing daily rate of ingested energy, and ranking food preference. Five food resources were provided to 10 individual flying squirrels (6 male, 4 female) for 5 consecutive days. Individuals were contained in separate experimental tanks. Each *G. volans* was provided with fruits of *Cornus florida*; acorns of *Quercus alba*, *Q. nigra*, and *Q. velutina*; and nuts of *Carya glabra*. *G. volans* ingested the most grams of *Q. alba*, averaging 53.6 Kcal·day⁻¹ of *Q. alba*. The average rate of ingestion for the Southern flying squirrel was 109.8 Kcal per day; thus *Q. alba*, constituted 49% of their

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daily diet. *Q. velutina*, *Q. nigra*, and *C. glabra* respectively were ranked next in dietary preference. Southern flying squirrels consumed 16.9 Kcal·day⁻¹ of *Q. velutina*, 15.5 Kcal·day⁻¹ of *Q. nigra*, and 10.7 Kcal·day⁻¹ of *C. glabra*. There was no clear overall pattern in food preference concerning these 3 foods: preferences varied among individuals. The least preferred food of *G. volans* was fruits of *C. florida*, averaging 9.1 Kcal·day⁻¹. These findings suggest that the survivorship of *G. volans* relates to a diversity of food resource availability.

Developing Kinetic Genotype-Phenotype Correlations for Missense Point Mutations in Human Protein O-Linked Mannose β -1,2 N-Acetylglucosaminyltransferase (POMGnT1)

Sam Hempel, CURO Honors Scholar
Dr. Lance Wells, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Human protein O-linked mannose beta-1,2 N-acetylglucosaminyltransferase, also known by its acronym POMGnT1, is a type II transmembrane glycosyltransferase found in the Golgi apparatus. POMGnT1 is one protein that plays a role in the larger pathway of O-mannosylation that is found in many different types of human tissues, most prominently in skeletal muscle, brain tissue, and the eyes. We are developing genotype-phenotype correlations for missense mutations in POMGnT1, a glycosyltransferase found in the mammalian O-mannosylation pathway. Several cases of POMGnT1 mutation in humans have been previously documented; however, the direct relationship between genetic mutation, molecular phenotype, and clinical presentation has yet to be well characterized. Muscle-Eye-Brain disease (MEB, OMIM 253280) is the predominant phenotype of genetic mutations in the POMGnT1 gene, yet the phenotypic variation that has been observed in POMGnT1 enzymatic mutants is too diverse to categorize under one “umbrella” – there is

a growing need for more specific genotype-phenotype correlations in POMGnT1 mutants. One exemplary missense mutation (R311G) presents as classical MEB: severe muscular dystrophy, mental retardation, and unique eye deformations. However, a different missense mutation in the enzyme (D556N) results in limb-girdle muscular dystrophy (LGMD, OMIM 613517), a mild form of congenital muscular dystrophy with *normal* brain function. Developing these correlations is the ultimate aim of the project. Towards this goal, we are using genetic techniques such as site-directed mutagenesis to develop several mutants of interest, and eventually we intend to measure enzyme stability and kinetics to characterize the ultimate molecular phenotype of each mutant.

Protein-Glycosaminoglycan Interaction Studies Using Surface Plasmon Resonance (SPR)

Alexander Herzog
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Glycoaminoglycans (GAGs) are complex polysaccharides that display unique binding and regulatory properties in the presence of specific proteins. These molecules are prevalent in the extracellular matrix, and they are sometimes referred to as mucopolysaccharides due to their viscous, mucous nature. Three of the sulfur containing GAGs, heparin, heparan sulfate, and chondroitin sulfate (CSA), contain structural similarities that significantly impact the physiological regulation of an organism. In this study, we biotinylated heparin, heparan sulfate and chondroitin sulfate through the reducing terminus of the GAG chain, immobilized the GAG on a sensor chip, and studied the interaction with GAG-binding proteins, SDF-1 and Slit3, through Surface Plasmon Resonance (SPR). SDF-1, an α -chemokine that binds to G-protein-coupled CXCR4, acts as an inhibitory

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factor that deters emigration of premature B cells out of bone marrow and interacts with heparin. The other GAG-binding protein, Slit3, is a large, secreted repulsive axon guidance molecule. Recent genetic studies reveal that Slit3 is dispensable for neural development, but required for non-neuron related developmental processes (where heparan sulfate is absolutely required for Slit-Robo signaling). Analysis of affinity constants for GAG-SDF-1 and GAG-Slit3 attachment, as well as their non-covalent interacting partners, is expected to provide a reasonable initiation for therapeutic intervention.

Effects of Platelet-Derived Growth Factor Receptor Inhibition on Feline Injection-Site Sarcoma Radiosensitivity

Joseph Hill,
Brittany Feldhaeusser
Dr. Michelle Turek, Anatomy & Radiology,
College of Veterinary Medicine

Platelet derived growth factor receptor (PDGFR) is a protein kinase that has been shown to be important in feline injection-site sarcoma (ISS) cell survival and signal transduction. Masitinib is a tyrosine kinase inhibitor that specifically targets multiple growth factor receptors including PDGFR. The objective of this study is to evaluate the effects of masitinib on the radiosensitivity of ISS cells. Clonogenic assays were performed using ISS cell lines to determine the effects of masitinib and radiation on cell survival. ISS cells were irradiated with a single radiation exposure (0, 3, 6, 9, 12 Gray). Survival was defined as the ability of the cells to maintain clonogenic capacity and to form colonies. After irradiation, cells were plated for colony formation and colonies consisting of ≥ 50 cells were counted following incubation. Clonogenic experiments were carried out in triplicate in two ISS cell lines, KH and Hamilton. For each cell line, radiation experiments were performed in control cells (without masitinib) and in cells exposed to 6 μM masitinib for 72 hours before irradiation.

Results indicate that masitinib and radiation decrease cell survival in a radiation-dose-dependent fashion. Masitinib at the dose and duration of exposure used here does not appear to alter the radiosensitivity of ISS cells. Based on these data, masitinib may not have a role in the management of ISS in combination with a single dose of radiation. Additional in vitro investigation may be warranted to explore the temporal effects of combination therapy.

Prisons for Profit: A New Approach to the Private Prison Model in the State of Georgia

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College of Arts & Sciences

The issue of prison reform and recidivism rates is a growing issue in the state of Georgia. Currently, Georgia operates the fifth-largest prison system in the nation, a majority of which is privately owned. At a cost of \$1 billion a year, the private prison system has absolutely no incentive to reduce the rate of incarceration and recidivism. Despite the growing problems of the Georgia prison system, little research has been conducted to accurately frame the issue and offer an alternative. This paper analyzes the business model of privately run prisons and isolates the factors that are inputs and outputs to the process. After an extensive cost/benefit and impact analysis review of various policy alternatives, a specific tool will be offered for identifying low-risk inmates as well as qualifications for community-based treatment programs. This researcher will also recommend a new business model for private prisons that eliminates the role of politics and corporate influence on profitability. These policy alternatives will ensure a more stable prison system that will be focused on helping rather than profiting.

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The Belle and the Behemoth: *Uncle Tom's Cabin* and the Southern White Woman

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In a paternalistic society like the antebellum South, women were not expected to have an opinion on politics or slavery. Yet *Uncle Tom's Cabin* blazed through the South, influencing many women to make a final decision on slavery one way or the other. Some saw it as a retched institution ruled by rich white men and governing over women with a brutal fist. Others remained loyal to its ideas of class, race, and downright way of life that the South had become accustomed to. This paper discusses the ways in which Harriet Beecher Stowe's characters influenced southern white slaveholding women. It will show that women indeed had an opinion about the "peculiar institution." Finally, it will show that their anger developed into attempts at changing the world they belonged to. The influence of *Uncle Tom's Cabin* on southern white women is crucial in showing that they had a voice and did attempt to make a change.

Development of a Genetic Screen for Vitamin B12 Uptake Mutants in Mycobacteria

Elena James, CURO Honors Scholar, CURO Summer Fellow
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Tuberculosis, a disease in humans resulting from infection by *Mycobacterium tuberculosis*, kills approximately 1.4 million people annually. Vitamin B12 is a cofactor in various *M. tuberculosis* metabolic enzymes. Utilization of vitamin B12 by this pathogen when added to culture suggests possible uptake of B12 from humans. Thus, *M. tuberculosis* vitamin B12 uptake proteins may serve as useful targets for antitubercular drug development.

My project is to develop a genetic screen for vitamin B12 transport mutants in mycobacteria. I created a plasmid in which an antibiotic-resistance gene is under the control of a B12 riboswitch, an RNA structure that blocks gene translation upon binding of vitamin B12. This plasmid, which can replicate in mycobacteria and *E. coli*, has DNA elements in this order: a transcription terminator, the promoter and B12 riboswitch from the *M. tuberculosis metE* gene, and a promoterless apramycin-resistance gene. This plasmid was introduced into a related species *Mycobacterium smegmatis*. We hypothesized that this plasmid would confer resistance to apramycin in mycobacteria only when vitamin B12 is absent from the culture medium. However, expression of the apramycin resistance gene is too high even when vitamin B12 is added. To reduce expression, the same DNA elements have now been cloned into a plasmid which is maintained in mycobacteria at a single copy per cell. If this plasmid confers tight vitamin B12 control of apramycin resistance in *M. smegmatis*, the next step will be to perform transposon mutagenesis in this strain and select for mutants defective in vitamin B12 uptake.

Noah Webster's *American Spelling Book* as a Product of Colonial American Culture and Economics

Emily Jessup
Dr. Bill Kretzschmar, English, Franklin College of Arts & Sciences

Noah Webster's *The American Spelling Book* was the most popular book of its time in America. The "blue-backed speller" shaped American education and culture, selling over 15 million copies in the years following its first publication in 1783. The success of Webster's speller is apparent; however, why he experienced such success is the question that still seeks an answer. The *American Spelling Book* could not have been produced successfully if Webster had not carefully considered different aspects of the text's

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physical publication and distribution, as well as how to distribute the text, once published, to those who would make up the intended audience. Webster's efforts to distribute his speller in the more urban and densely populated northern states ensured his speller would have greater and more immediate success as opposed to the southern states where the population was less dense and more diffuse. In addition, the culture of American education was ripe for change as nationalism swept the country in the post-Revolutionary War years. It was an opportune time for the introduction of a speller like Webster's, full of religious and nationalistic sentiments. An examination of the location and economics of the printing industry, the population diversity of the possible audiences for Webster's book, and the changing culture and educational structure of the late-eighteenth century demonstrates that Webster's success, while in part due to the educational material the speller introduced, was in larger part owing to his considered and calculated distribution.

Examining Genetic Diversity in Peruvian Samples of *Plasmodium falciparum*

Rachel Johnson, CURO Honors Scholar
Dr. David Peterson, Infectious Diseases,
College of Veterinary Medicine

Plasmodium falciparum is a causative agent of Malaria, a disease which affects hundreds of millions of people annually. VAR2CSA is a member of the Duffy-Binding like (DBL) protein superfamily which has been shown to mediate binding of the parasite to a unique host receptor. VAR2CSA is a highly polymorphic protein, a target of the immune response, and understanding the level of diversity in this protein is important. Previously, we cloned the DBL3x domain of VAR2CSA from Kenyan blood samples into plasmids, which were then sequenced. In collaboration with the CDC, we now seek to characterize diversity among *P. falciparum* from Peruvian samples. DBL3x was first amplified from sixteen different Peruvian samples,

followed by ligation into a plasmid vector. After transformation of the PCR product into chemically competent *E. coli* cells, positive colonies were identified and sequenced using conventional sequencing methods. The DBL3x region was confirmed and located in the sequencing results. At the conclusion of this project, we plan to have DBL3x-positive sequences from at least ten of the original sixteen samples. All sequencing results will be analyzed in order to characterize the diversity among the Peruvian *Plasmodium falciparum* population. Furthermore, we seek to quantify the genetic differences between the Peruvian samples and the previously studied Kenyan samples. By studying the genetic variation of the DBL3x domain, we seek to come to a deeper understanding of the mechanisms by which parasites, specifically *Plasmodium falciparum*, bind to their host and cause infection.

Inflammatory Cell Markers' Gene Expression in Mouse Model of Placental Malaria

Mathew Joseph

Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

One of the foremost health issues in the developing world during pregnancy is malaria, with nearly half the world's population living in high-risk areas. *Plasmodium falciparum*, transmitted by the Anopheles mosquito, is the deadliest protozoan parasite which causes malaria in humans. We have recently initiated studies on malaria during pregnancy using *Plasmodium chabaudi* AS (a rodent plasmodium species) to infect C57BL/6J (B6) and A/J mice as model platforms for understanding the immunopathogenesis of malaria during pregnancy. On day zero of pregnancy, mice are infected with *P. Chabaudi* inoculum. Throughout gestation, secreted cytokine and chemokine proteins are assayed by ELISA. Tissues from mice spleens and fetoplacental units are homogenized and RNA is isolated. cDNA is made from the RNA and real-time

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PCR is performed to assess levels of T cell markers with specific primers. The data obtained show that *CD3e* (T cell marker), *Hprt2* (B cell marker), *Mgc12* (macrophage marker), and *Klr1* (natural killer cell marker) are upregulated in infected pregnant A/J and B6 mice relative to their respective uninfected counterparts. This implies that *Plasmodium chabaudi* induces a local placental inflammatory response as does human malaria during pregnancy. Our research analyzes the mechanistic basis for malaria-induced compromise of pregnancy, especially mid-gestation, when high parasitic density is coincidental with pregnancy loss in our model. Continued study promises to reveal common and critical mechanisms that contribute universally to malaria-induced compromise of pregnancy.

Private Equity in Brazil

Samuel Kinsman

Dr. Jeff Netter, Banking & Finance, Terry College of Business

This research broadly analyzes the development of financial markets in Brazil with specific focus on private equity (PE) investment. Private equity's well-known absence of public company regulation and reporting requirements have appealed to investors because of the opportunities for increased returns. Likewise, PE investments in private companies can connect investors with high growth companies not listed on public exchanges. Recent trends in PE fundraising suggest investors in developed economies are allocating more capital to emerging economies to take advantage of higher growth opportunities. This research project seeks to document important trends in Brazilian PE deal financing structure including equity vs. debt ratios, minority stake vs. majority stake investments, and foreign vs. domestic capital sources. Controlling for other relevant factors, regression tests will link the data to key macroeconomic indicators to create a model for prediction of PE investment trends in

Brazil. Initial research suggests declining macroeconomic indicators such as declining inflation rates have impacted the structure of PE investment by lowering the cost of debt for investments. Research findings may explain why PE investors are turning to Brazil and how monitoring readily available macroeconomic indicators can be a useful tool to quickly estimate the expected growth of Brazilian PE funds from both domestic and foreign investors.

A New Approach to Histomoniasis: Data Mining and Targeted Drug Sensitivity

Michael Klodnicki

Dr. Robert Beckstead, Poultry Science, College of Agriculture & Environmental Sciences

Histomonas meleagridis, the causative agent of blackhead disease in gallinaceous birds, is an anaerobic parasite that lacks mitochondria. Few treatment options exist for *Histomonas* infection, the most effective of which is banned in the United States and Europe for application in livestock bound for human consumption. Previous studies on closely related organisms have revealed certain details of their anaerobic, hydrogenosomal-centered metabolism, providing a clear target for drug treatment that is distinct from the host's metabolism. Using a multi-disciplinary approach, we have generated a cDNA library of the *H. meleagridis* genome and an annotated contiguous DNA sequence database to study virulence factors and specific metabolic components. Additionally, we examined the potential and efficacy of novel methods of controlling infection by targeting the hydrogenosome. In this study, we demonstrate through a series of sensitivity assays that application of variable concentrations of zinc in solution significantly inhibits in vitro growth by acting on the hydrogenosome. Furthermore, we evaluated potential methods of zinc delivery in vivo to begin treatment development for livestock application.

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International Boundary Settlement and Domestic Conflict

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Dr. Andrew Owsiak, International Affairs,
School of Public & International Affairs

After they settle their borders, do states intensify repressive practices and experience a higher rate of intrastate violence? Previous studies have shown that states with unsettled borders experience higher levels of militarization, centralization, and social cohesion relative to states with settled borders. Theoretical arguments, however, are indeterminate regarding the precise effect that international border settlement has on domestic uses of violence. In this study, I will test the expectations of these divergent theoretical arguments. I will identify complete border settlement as a potential influence on the occurrence of intrastate conflict and confirm an empirical relationship between the two variables. I test the arguments using data on international border settlement and civil conflict during the period 1816-1997. Through its findings, this study will demonstrate the previously unrecognized implications of the positive action of state border settlement for a state's susceptibility to civil conflict. If complete border settlement renders a state more or less likely to experience internal unrest in subsequent years, then recognizing this correlation would enable policy makers to take steps to address the potential influences associated with this action.

Individual Environmental Awareness and Urban Water Conservation in Kunming, China

Logan Krusac, Foundation Fellow
Dr. Larry Nackerud, School of Social Work

Although the majority of water use in China occurs in the countryside, the responsibility for water conservation flows from the urban population centers outward. This research employs surveys of urban residents in

Kunming, Yunnan Province in order to illustrate China's urban centers' growing impact on water conservation. This study determines what contributes to effective environmental awareness and analyzes the relationship between an individual's awareness and his or her in-home water conservation methods. The results show that first-hand environmental awareness is significantly more effective in encouraging conservation than is traditional environmental education. In addition, the survey reveals a pervasive lack of awareness in urban Kunming, with only 4 percent and 13 percent of respondents correctly identifying the price and source of their water, respectively. Only 59 percent of those surveyed believed they could have any influence in solving China's water crisis—a statistic that must change in order to promote greater urban water conservation.

Exploring Medical Practice Through Chekhov's Literature

Elina Kumykova, CURO Scholar Graduation Distinction
Dr. Elena Krasnostchekova, Germanic & Slavic Studies, Franklin College of Arts & Sciences

The relationship between literature and medicine has been reflected in many great literary texts. Doctors often become involved in the stories of their patients' lives. Literature, too, has the human being for its object. Many physician-writers explored their feelings and concerns about individual characters or patients in their writing. Medical practice has served as a rich source of material for some well-known authors, such as Arthur Conan Doyle, Anton Chekhov, and William Carlos Williams. The first purpose of this research is to examine the influence of Anton Chekhov's medical practice on his writing. The study will describe Chekhov's medical practice and his daily routine of seeing patients. Using biographical materials, the period of 1892-1897 when Chekhov served as the "Country Doctor" in Melikhovo will receive specific

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attention. At this stage, the study seeks to understand why some existing research depreciated Chekhov's medical practice. The second purpose is to describe insights into the art of medicine offered by Chekhov's writing and particularly by "Ionych," "A Case History," "Ward Six," and "Uncle Vanya." At this stage, the study will describe Chekhov's insights into the doctor-patient relationship, specific diseases, medical ethics, etc. As a result, I seek to understand why Chekhov called medicine his "lawful wife" and literature his "mistress."

The Moderating Role of Romantic Relationship Satisfaction on the Relation Between Parenting Stress and Maternal Hostility

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Suzanne Meller
Dr. Anne Shaffer, Psychology, Franklin
College of Arts & Sciences

Prior research has established an association between high parenting stress and parental hostility (i.e., harsh, punitive discipline; Sturge-Apple et al., 2010). Additionally, research has identified romantic relationship satisfaction as a moderator on the relation between self-reported parenting stress and mothers' report of parenting hostility (Deater-Deckard & Scarr, 1998); however, few studies have examined observed parent hostility toward children during middle childhood.

The current study examines the moderating role of mothers' romantic relationship satisfaction on the association between maternal stress and observed maternal hostility in a diverse community sample of 39 mother-child dyads (child ages 8-11). Dyads completed a conflict discussion task, attempting to reach compromise on a topic of current conflict (e.g., homework, fights with siblings, chores). These discussions were video recorded and later coded for maternal hostility with adequate interrater reliability. Indicators of hostility included rejecting statements, cynicism, and mothers'

disregard for her child. Mothers completed the Parenting Stress Index (PSI-SF; Abidin, 1995), and indicated their current level of relationship satisfaction on a seven-point scale. We hypothesized that under high parental stress, high romantic relationship satisfaction will buffer maternal hostility and low relationship satisfaction will exacerbate levels of maternal hostility. The overall model that examined relationship satisfaction as a moderator was significant ($F(3, 35) = 6.27, p < .01; R^2 = .59$). The main effects of parenting stress ($t = 3.24, p < .05$) and relationship satisfaction ($t = 2.15, p < .05$) on hostility were significant, as well as their interaction ($t = -3.21, p < .05$), indicating moderation.

Development of a Vector to Delete the β -lactamase Gene from Mycobacteria

SaiSudeepti Kuppa
Dr. Russell Karls, Infectious Diseases, College
of Veterinary Medicine

Mycobacterium tuberculosis causes tuberculosis, a disease which in 2010 claimed 1.4 million lives, out of which 350,000 individuals were also infected with the HIV virus. This bacterium is resistant to β -lactam antibiotics, such as penicillin, because it carries the *blaC* gene encoding a β -lactamase which cleaves and inactivates this class of drugs. The live vaccine strain *Mycobacterium bovis* BCG carries an identical *blaC* gene and can cause disease in people infected with HIV. A live vaccine that is sensitive to penicillin is considered to be safer as this drug could be used to treat people who develop disease from the vaccine. Therefore, the goal of this project is to delete the *blaC* gene from *M. bovis* BCG and from *M. tuberculosis*. A former student in the lab created plasmid pAR17, which is designed to facilitate deletion of any targeted mycobacterial gene by specialized transduction. Upon testing the system by targeting a specific gene, it was discovered that pAR17 may be too large after combining with transducing mycobacteriophage DNA to be stably

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packaged into phage capsids. To address this, plasmids pSK1-pSK4 were generated by deletion of nonessential regions from pAR17. Plasmids pSK3 and pSK4 are currently being modified to target deletion of *blaC*. The resulting plasmids will be useful in evaluating if smaller plasmid size addresses the in vitro packaging problem observed with pAR17 and in mutating the *blaC* gene in pathogenic mycobacteria.

Construction of a *vapB* Deletion Mutation in a Swine Isolate of *Rhodococcus equi*

Monica LaGatta

Dr. Mary Hondalus, Infectious Diseases,
College of Veterinary Medicine

Rhodococcus equi, a Gram-positive facultative intracellular bacterium, is a pathogen of foals, pigs and immunocompromised people. In foals and humans, *R. equi* typically causes bronchopneumonia, whereas in swine the predominant clinical presentation is lymphadenitis. The ability of virulent strains of *R. equi* to replicate intracellularly in host macrophages and establish chronic disease is dependent on the possession of a large extrachromosomal virulence plasmid. This virulence plasmid contains a pathogenicity island (PAI), which encodes a novel family of genes called virulence associated proteins (*vaps*). The PAI of foal plasmids possess *vapA*, a gene encoding a surface-expressed lipoprotein shown to be essential for intracellular replication and establishment of a chronic infection in a murine model system. In contrast to equine isolates of *R. equi*, swine isolates are vastly unstudied. It is known however, that the virulence plasmid of swine isolates has significant homology to that of foal isolates. Nonetheless, swine plasmids do not contain *vapA*, rather they possess the related gene, *vapB*, which shares ~80% sequence identity at the amino acid level. *VapA* and *VapB* are hypothesized to be functionally equivalent proteins in their respective hosts. To determine if *vapB*, like *vapA*, is essential for intracellular replication,

we used a two-step allelic exchange strategy employing a single crossover intermediate and counter-selection to construct a marked deletion mutant of *vapB*. The requirement of *vapB* for intramacrophage growth will be assessed by comparison of the intracellular growth phenotypes of the *vapB* mutant and wild type *R. equi* using standard in vitro macrophage infection assays.

Development of Nut-Cracking Skills in Wild Bearded Capuchin Monkeys (*Sapajus libidinosus*)

Kellie Laity, CURO Summer Fellow

Dr. Dorothy Fragaszy, Psychology, Franklin
College of Arts & Sciences

Bearded capuchin monkeys crack nuts using large stones as hammers. This behavior is thought to be traditional. Juvenile capuchins (birth to four years old) are not directly taught by adults how to crack nuts, nor can they crack nuts open themselves, yet they spend a lot of their time for several years participating in percussive activities. We set out to study adult and peer facilitation on nut-cracking behaviors of juvenile capuchins. Our hypothesis is that nut-cracking activities of group members support young monkeys' practice with nuts and stones during the years that they cannot open nuts themselves. We collected data in Piauí, Brazil on a group of nineteen capuchin monkeys. Behavioral data were collected for eleven juvenile monkeys (4 – 54 months) by observing consecutive focal juveniles and their neighbors for 20 minute periods over eight weeks (393 focal samples). Manipulation of nuts increased with age ($R^2 = 0.78$, $N = 11$, $p < 0.001$). Within-subject analyses are in progress; currently we know that for five individuals, manipulation of nuts increases when two or more other individuals in the group are concurrently manipulating nuts. These data support the hypothesis that juveniles' practice related to nut-cracking is promoted by group activities. Further analyses will be conducted to find if a) specific individuals' activities, b)

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hearing (but not seeing) others crack, and/or c) encountering artifacts of previous cracking (nut shells, stones) promote percussive activity by juveniles. Research supported by the National Geographic Society and CURO.

Information as Narrative Poison or Poultry in Ergodic Literature

Connor Land

Dr. Richard Menke, English, Franklin College of Arts & Sciences

This presentation focuses on the impact of information on the narratives of ergodic texts, conventionally known as videogames. In *The Storyteller*, Walter Benjamin explains that information and narrative differ in that “the value of information does not survive the moment in which it was new. It lives only at that moment,” whereas “a story is different. It does not expend itself. It preserves and concentrates its strength and is capable of releasing it even after a long time.” Most modern games contain both information and narrative. Games will often stream statistics on a heads-up-display in the game while simultaneously involving the player in narrative events. From a background in narrative studies, I will try and discover if information has as dire an effect on games’ narrative content as Benjamin would contend. Using reading materials from previous research, supplemented with those in the areas of information and narrative minimalism, I will discuss how storytelling in gaming is either hurt or helped by information. The burgeoning field of ludic studies contains a few notable works in its own right, but it lacks papers addressing one narrative issue with a perspicacious focus. Thus this presentation seeks to start a more nuanced dialogue about the games we take for granted as toys and link videogame studies with other narrative media such as film, photography, and the novel.

Immortalization of Primary Swine Respiratory Epithelial Cells

Christopher Lee

Dr. Ralph Tripp, Infectious Diseases, College of Veterinary Medicine

Influenza A viruses pose a significant risk to human health due to their continuous evolution and zoonotic potential. Swine are thought to be a mixing vessel for generation of reassortant influenza viruses because they can be infected with both avian and human influenza A viruses, and unlike humans, readily support replication of avian influenza viruses. To advance disease intervention strategies, there is a critical need to better understand the innate antiviral responses of swine respiratory epithelial cells to avian influenza virus infection. Unfortunately, few if any immortalized swine bronchoalveolar epithelial cell lines exist which are needed to facilitate these studies. In this study, we harvested and isolated primary normal swine lung epithelial (NSBE) cells from a healthy pig and attempted to immortalize the cells using various procedures. After isolating the NSBE cells from all other components of the lungs, the cells were infected with a lentivirus construct carrying a simian virus 40 (SV40) T antigen to induce immortalization by suppressing the p53 tumor suppressor protein. The results suggest that this method of cell transformation has the capability to immortalize NSBE cells, and we have isolated several colonies of immortalized cells. Prospective studies with these transformed NSBE cells will be performed to identify pathways and mechanisms that influenza virus uses to infect and undergo reassortment with other influenza A viruses in host swine respiratory epithelial cells.

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The Contribution of Environmental Contamination with *Salmonella* to Human Illnesses in Georgia

Michelle Lee

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In the US, *Salmonella* causes 1.4 million illnesses each year. While most cases in the past have been attributed to the consumption of fecally-contaminated food, *Salmonella* infections by non-food borne strains, more specifically environmental strains, have been increasing in humans. The environment has a potential role in the lifecycle of *Salmonella*, and consequently, it can affect its geographic distribution. By investigating the distribution of *Salmonella enterica* serovars in the environment, specifically from surface waters and wildlife species inhabiting the collection sites, as well as collecting relevant geographical information, we can determine the ecological interactions that contribute to salmonellosis in humans. Monthly surface water samples from the Little River (three sites) and the North Oconee River (three sites) were collected and sampled for *Salmonella*. A total of 13 *S. enterica* serovars among 197 *Salmonella* isolates were compared genetically using pulsed-field gel electrophoresis (PFGE). Several *Salmonella* strains from this study were identical to human isolates in the CDC PulseNet database. PFGE patterns of *S. Braenderup*, type Br2, and *S. Muenchen* isolates were identical to human isolates in the CDC Pulsenet database, providing further support for the contribution of environmental contamination to human illness.

Characterization of the Tneap Complex in the CRISPR-Cas Viral Defense System of Prokaryotes

Marianne Ligon, CURO Honors Scholar, Ramsey Scholar, CURO Summer Fellow

Dr. Michael Terns and Dr. Rebecca Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The CRISPR-Cas (**C**lustered, **R**egularly-**I**nterspaced, **S**hort **P**alindromic **R**epeats and **C**RISPR-associated genes) system is a recently discovered defense system present in approximately 40% of bacteria and 90% of archaea. Small RNAs and ribonucleoprotein (RNP) complexes provide the basis of this adaptive, genetically-heritable immune system that protects prokaryotes against viruses, plasmids, and other genome invaders. There is a wide variety of both conserved and subtype-specific *Cas* genes, but little is known about the biochemical activity of the majority of these gene products and RNP complexes. In this study, the *Tneap* subtype proteins are investigated in how they function within the CRISPR-Cas system to confer immunity. Recombinant proteins and synthetic RNAs cloned from the thermophilic archaea *Pyrococcus furiosus* and *Thermococcus kodakarensis* are used to ascertain structural and functional components of the *Tneap* RNP consisting of three proteins, Cst1, Cst2, and Cas5t, and a crRNA (CRISPR RNA). I show that these proteins form an RNP complex with crRNAs of varying length and are able to bind ssDNA and dsDNA in a crRNA- and homology-dependent manner. Further work involving a predicted nuclease, Cas3, must be done to determine the function of the *Tneap* RNP complex. The *Tneap* RNP requires few genes to assemble, and therefore may be useful in applying the CRISPR-Cas system to a variety of industries, including the biofuels, biotechnology, dairy, and gene therapy industries.

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Stimulation Current Does Not Influence NIRS Measured Metabolic Rate

Hillary Liken

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Near infrared spectroscopy (NIRS) has been used to evaluate skeletal muscle oxygen levels and metabolic rates. This study tested the effect of different electrical stimulation current levels on NIRS measured metabolic rate. Healthy subjects (six females, ages 23-32) were tested. A dual channel NIRS device (Oxymon, Artinis) was used with separation distances between 3.0-4.5 cm, placed over the medial gastrocnemius or vastus lateralis. Surface electrical stimulation produced muscle activation. Each subject was stimulated for three two-minute stimulation periods at 4 Hz with randomized current levels. Between levels, a 10 second ischemic period was used to measure metabolic rate. A five-minute duration ischemic cuff with reactive hyperemia was used to calibrate NIRS signals. Oxygen saturation during stimulation was not significantly different ($F(2,15) = 0.02, p = 0.980$) between current levels (70.1 + 8.6 %, 69.7 + 13.4 %, 71.0 + 9.4 % low, med, high current) and was similar to resting oxygen saturation (65.9 + 11.9 %). Metabolic rate was not significantly different ($F(2,15) = 0.085, p = 0.919$) between current levels (1120%, 1118%, 1118% of resting metabolic rate for low, med, high current). Longer separation distances gave results similar to those reported for shorter separation distances. Small differences in current levels at or above 50 mA did not influence muscle oxygen saturation or metabolic rate following electrical stimulation. Separation distance also did not influence these measurements. This suggests that electrical stimulation is a feasible method of activating skeletal muscle for NIRS-based measurements of muscle metabolism.

The Relationship Between Macular Pigment and Neural Compensation

John Liu

Dr. Lisa Renzi, Psychology, Franklin College of Arts & Sciences

Macular pigment is a collection of dietary carotenoids within the central retina, which is known for its ability to improve visual function by filtering short-wave light. MP optical density varies widely in the population; consequently, some individuals filter the majority of the short-wave light that enters the eye from a combination of MP and a yellowing lens, while others with little to no MP and a relatively clear lens must transduce the majority of short-wave light that enters the eye. Despite these differences in the amount of short-wave (blue) light that reaches the retina and, consequently, the amount of visual improvement that can be achieved as a result of having MP in the retina, past research suggests that the majority of individuals are similarly sensitive to short-wave light. The purpose of this project is to determine whether or not compensation within the central nervous system is responsible for the relatively uniform short-wave sensitivity seen in the population, despite differences in the amount of light that reaches the retina.

Phospholipase Expression in Cocaine-Addicted Rats

Casey Love

Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Recent studies from our laboratory show that exposure of rats to cocaine, followed by withdrawal and re-exposure significantly alters the expression of several different types of phospholipids in multiple brain areas. Alterations in select phospholipids correlated to increased sensitization to cocaine and increased intensities of initial responses to cocaine re-exposure. The expression of several types of phospholipids in the brain is

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controlled by a class of enzymes called phospholipase A2 (PLA2). We hypothesize that the exposure of rats to cocaine will alter PLA2 expression. Four of the many isoforms were chosen for this experiment: iPLA2 beta, iPLA2 gamma, NTE, and GAPDH was used for the control. Expression was assessed using reverse transcriptase and quantitative-polymerase chain reactions (RT- and qPCR, respectively), which also assess the level of mRNA expression. We found that NTE, iPLA2 beta, and iPLA2 gamma were expressed in control brains at different levels depending on the brain region. NTE seemed to be expressed more in the Cerebellum with the other three areas (ventral striatum, dorsal striatum, and Hippocampus) close behind. NTE was expressed the least in the Hippocampus of the control brains which is where the phosphatidylcholine levels were found to be increased after cocaine exposure, withdrawal, and re-exposure. iPLA2 beta had the highest levels of all three enzymes in all four regions of the brain with the hippocampus second to last in its levels. Furthermore, the difference in expression of these enzymes were little to none for the hippocampus area and the cerebellum had a greater expression of all of the enzymes in the cocaine addicted brain tissues versus the saline treated tissues out of four different tissues of the same brain area.

The Molecular Dynamics of Atomic Sticking Coefficients

Katie Manrodt, CURO Honors Scholar,
CURO Summer Fellow
Dr. Steven Lewis, Physics & Astronomy,
Franklin College of Arts & Sciences

Interstellar dust has been shown to be a common mechanism for the formation of molecular hydrogen; however, the “sticking probability” of atomic hydrogen impinging on these surfaces remains somewhat controversial. This project aims to provide continuity between two conflicting past studies. In 1998, Takahashi, Masuda and

Nagaoka preformed a computational study of the sticking probability of atomic hydrogen. A study done in 2002 (Al-Halabi, Van Dishoeck, and Croes) cited experimental data showing an error in the previous study: the sticking probability was actually much lower than the 1998 study determined. This project utilized the code from the 1998 computational study, modified it according to the methods cited in the 2002 paper, with the intention of comparing results to that of the 2002 study. Computations were carried out using the classical molecular dynamics technique. Our corrected sticking probability is higher than the one found in the 2002 and 1998 paper, which was not expected. We are currently looking into what could have this affect, exploring the properties the slab of water ice used, etc. Ultimately, this project will be used as the starting point for more simulational studies of the sticking probability of carbon and nitrogen.

Lost Chapters in the *Wind-Up Bird Chronicle*: A Translation and Commentary

Kieran Maynard
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Franklin College of Arts & Sciences

Murakami Haruki is the most translated living Japanese author. His longest novel, *Nejimakidori kuronikuru* (1994, 1995), has been translated into English as *The Wind-Up Bird Chronicle* (1997) by Jay Rubin, who cut about 61 of 1,379 pages, including three chapters (Book 2 Chapters 15, 18, and part of 17; and Book 3 Chapter 26). Other sections were rearranged or altered. I will translate the omitted sections, compare my reading of the altered sections and the entire work to Rubin's, and comment on the effects of translation practice on the English language text as a literary work. My theory of translation practice is drawn primarily from Venuti (1998) who proposes a “foreignizing” translation practice to counter ‘domestication’ that occurs when a work is translated between

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cultural contexts. Translation “approximates” the experience of a literary work in another language; the “source text” and the translation have a “performative relation” (Venuti 1998). I have completed translating Chapters 15 and 17, and part of 18, and have noted that the most frequently omitted character is one Rubin claims detracts from the book. I expect the omitted chapters will invite a new interpretation of the novel, despite Rubin’s claim, “We are *not* talking about huge textual differences between the Japanese original and the English translation” (Rubin 2002); that choice of translation practice will be found to have artistic and ethical implications; and that a better understanding of these choices as they relate to Japanese and to literature will benefit translation studies as a whole.

War, Peace, and Seduction: An Analysis of Tolstoy's H el ene Kuragin as a Symbol of Female Sexuality

Melissa McDaniel

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Franklin College of Arts & Sciences

In the tradition of the Greek epics *The Iliad* and *The Odyssey*, Leo Tolstoy's masterpiece *War and Peace* observes and re-interprets the impact of fate (what Tolstoy calls “history”) on personalities, from the high and virtuous to the low and deceitful. H el ene Kuragin of *War and Peace*, a deviation of Helen of Troy, is too often dismissed as little more than a typical femme fatale by critics who gloss over her connection to the epic Helen. An analysis of her treatment as symbol of violent sexuality in terms of the epic tradition reveals what the vilification of H el ene means about the relationship of men and women in a world of both war and peace. While others have analyzed the depiction of women in Tolstoy's literature, they have more often focused on the novel *Anna Karenina* or Natasha Rostov, the girlish heroine of *War and Peace*, and H el ene's place within the events of the novel is often overlooked. This investigation will compare the vilified H el ene to victimized

Helen of Troy in order to point out how Tolstoy prevents H el ene from receiving the same sympathy as her precursor. In the few scenes in which she appears, Tolstoy focuses on H el ene's body as an instrument of war, revealing the novel's underlying connection between wealth, murder, and unnatural sexual promiscuity. Through Natasha, Tolstoy illustrates his admiration for the fortitude and fertility of Russia, but H el ene displays fear of the corrupting violence of female sexuality.

Public Art in Athens-Clarke County

Brittany McGrue, CURO Honors Scholar
Dr. Marilyn Wolf-Ragatz, Lamar Dodd
School of Art

Public art refers to any piece of artwork meant to be displayed and enjoyed in the public sphere, and pertains to all the arts. Public art can be funded through government channels, private funding, or philanthropic efforts. Important benefits of a public art program include those of education, aesthetics, job stimulation and economic development. Although Athens-Clarke County is considered an arts community with some established public art, the community was interested in structuring a program that would build upon that foundation. In order to explore the possibilities of creating a program, the mayor's office appointed a task force in April of 2010 and charged the group with researching public art programs, identifying possible funding sources and inventorying established public art. A 1% for art ordinance was recommended by the task force and approved by the Mayor and County Commissioners late in 2010. The Athens Cultural Affairs Commission, a 9-member commission of community volunteers that works in tandem with the government, was created in March of 2011. My research has involved participating in meetings of both the task force and the ACAC, facilitating communication, researching the topic of public art, and most importantly, observing the process of creating a public art program.

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A final responsibility of my participation in this progression was to create the foundation and procedure for inventorying the County's present art collection. This was done using PastPerfect museum software provided by through the County's Arts and Leisure Department.

Discrepancy Between Client Expectations and Doctor Reports of the Success in Treatment of Veterinary Patients

Caitlin McManemon

Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Numerous factors affect patients' expectations after a consultation with their doctors regarding various illnesses. The patients themselves, their degree of worrying, the number and types of problems and symptoms they encounter, and the previous knowledge and experience they have with their condition can all play a role. This could lead to the patient either overestimating or underestimating his or her likely chance of successful recovery. Such a disconnection could also result when patients regard other important matters, such as their animals. This experiment intends to establish whether or not an analogous disagreement exists, and then to delve into and understand the reasons behind why the dissonance may occur. The study consists of two separate surveys, one that will be given prior to the first consultation, and one that will be administered immediately following the consultation during the same visit. The surveys include the Depression-Anxiety-Stress Scale 21, the Comfort from Companion Animals Scale, and the Illness Worry Scale. By utilizing these select scales, the study aims to find a potential correlation between various degrees of depressive, anxious, and worry-related symptoms characteristic of the participants themselves, as well as their subjective assessment of their bond with their pets, which may illuminate sources affecting their future outcome appraisals. These results

may uncover new ways to lessen the gap and promote more effective veterinarian-client consultations with regards to the expected outcome of the animal patients.

Effects of Helminth Infection on Local and Systemic Immunity

Lindsey Megow, CURO Summer Fellow

Dr. Kaori Sakamoto, Pathology, College of Veterinary Medicine

Bovine tuberculosis, caused by *Mycobacterium bovis*, is a serious, reportable, zoonotic problem primarily affecting bovids worldwide. Control of *M. bovis* infection requires an effective T helper (Th)1 response. On the other hand, infection by intestinal helminths, a common problem in wild bovids, triggers a Th2-skewed immune response. We therefore hypothesize that when an animal is infected with intestinal nematodes, the resulting systemic Th2-skewed environment created by the immune system down-regulates the Th1 response, decreasing the ability of the animal to fight the mycobacterial infection. We are developing a mouse model to study this effect. The mice are co-infected with the intestinal nematodes *Heligmosomoides bakerii* and *Nippostrongylus brasiliensis*, followed by intratracheal instillation with *M. bovis*, in order to mimic the conditions found in an African buffalo study by our collaborators, the Ezenwa laboratory. At specific time points after infection, tissues from the lung, intestines, and regional lymph nodes will be harvested for histopathology, flow cytometry (to determine recruited leukocyte subsets), and ex vivo cytokine production. Serum will also be collected to study the systemic cytokine responses. Preliminary results have shown an increased local pro-inflammatory cytokine response in the lungs, with increased eosinophil recruitment and perivascular cuffing. Results have also shown greater T lymphocyte recruitment to the lungs and intestines with nematode co-infection as compared to single nematode infection. Co-

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infection also exhibited a suppressive effect on *H. bakerii* egg production. After optimizing the helminth co-infection, mice will be intratracheally infected with *M. bovis*.

Histological and Protein Expression Changes in Mouse Models of Early Dystroglycanopathy

Garrett Melick

Dr. Aaron Beedle, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Dystroglycanopathies, characterized by progressive muscle weakness and wasting, are associated with abnormal glycosylation of alpha-dystroglycan (α DG). Fukutin is one of six proteins known to be important for α DG glycosylation (Barresi, Campbell 2006); and we have shown that knock out of the mouse fukutin gene early in skeletal muscle development (*Myf5-cre/Fktn* KO) elicits severe dystroglycanopathy. Here, we hypothesize that loss of dystroglycan function during skeletal muscle differentiation disrupts muscle signaling pathways to promote the severe disease phenotype. To address this research question, we studied skeletal muscle fiber type specification, which is a downstream readout of differentiation pathways, using immunofluorescent imaging of myosin heavy chain genes in knockout (K) and littermate control (LC) mice at 4 and 8 weeks of age. We then correlated myosin heavy chain expression, to indicate muscle fiber type, with disease severity. Preliminary data suggests altered fiber type distribution in KO mice that is correlated with mouse age. As expected, the iliopsoas muscle showed considerably different fiber isotype content than quadriceps muscle. Thus, fiber type specification appears altered in dystroglycanopathy mice in an age- and muscle-group-dependent manner. These data are significant because they suggest that differentiation signaling pathways are altered and may contribute to disease severity in our mouse model. Further analysis of these

abnormal signaling pathways may provide targets for new therapeutic strategies.

Emotion Regulation and Childhood Depression: An Examination of Moderators

Suzanne Meller

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Emotion regulation is the ability to modify or maintain emotions in order to successfully navigate emotional experiences (Gross & Thompson, 2007). Children experiencing significant deficits in emotion regulation have an elevated risk for developing psychopathology (Zeman et al., 2002), including childhood depression (e.g., Betts et al., 2009). The majority of studies examined middle-class Caucasian samples (e.g. Silk et al., 2003), while other potential moderators (i.e. child gender, parent perceived child difficulty) have yet to be investigated in diverse samples. In order to understand whether the association between child emotion regulation and child depressive symptoms differs depending on ethnicity, child gender, family income, and parents' perceived child difficulty, we propose a series of moderation models. Participants include 64 mother-child (ages 8-11; 40.6% male;) dyads from a diverse sample (i.e. Caucasian, 40.6%; African American, 51.6%; yearly income < \$20,000, 49.9%). Children's emotion regulation was assessed using the self-reported Child Emotion Management Scale (CEMS; Zeman et al., 2001) and via behavioral coding of the interaction tasks. Child depressive symptoms were assessed via the Child Depression Inventory (CDI; Kovacs, 1992). Perceived child difficulties were measured using the Parenting Stress Index subscale (PSI-SF; Abidin, 1995). Results showed that children's problems with emotion regulation were consistently associated with depressive symptoms for all examined moderators (i.e. gender, parent perceived child difficulty, ethnicity, income). The association between

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emotion regulation and depressive symptoms regardless of gender, perceived difficulty, ethnicity and SES stressed the importance of children's development of adaptive emotion regulation abilities in the prevention of depressive symptoms.

Cumulative Risk and Child Psychopathology: Understanding the Role of the Parenting Relationship

Suzanne Meller,
Sophie Arkin, Isabel Cohen
Dr. Anne Shaffer, Psychology, Franklin
College of Arts & Sciences

Children experiencing multiple risks throughout development have elevated likelihood of experiencing psychopathology (Flouri et al., 2009). Cumulative risk, the combined effect of several risk factors (e.g. single parenthood, low income; see Obradovic et al., in press), is a greater predictor of negative child outcomes than any single risk factor alone; thus, it is important to examine risks in combination versus isolation (e.g. Sameroff, 2006). Although children experiencing multiple risks have greater chance of experiencing psychopathology, positive parent-child interactions have potential to mitigate these negative effects (Trentacosta et al., 2008). This study expanded on literature by examining the positive relation between cumulative risk and child psychopathology in a demographically diverse sample, and predicted positive parent-child interactions would moderate (i.e., buffer) this association. 64 mother-child (8-11 years) dyads completed interaction tasks recorded for subsequent coding. Positive parent-child interactions were assessed using observed shared positive affect (e.g., mother laughed and child shared in the experience by smiling/laughing). Cumulative risk was calculated based on previous research (e.g. Grant et al., 2003), and included eight mother-reported risk factors (e.g., recent life stressors; annual income under \$20,000; clinical levels of psychopathology assessed via the Symptom

Check List-90-Revised; Derogatis, 1994). Child psychopathology was assessed via maternal self-report (Child Behavior Checklist; Achenbach, 1991). Cumulative risk was related to more externalizing problems in children only when there were low levels of shared positive affect between mother and child ($\beta = -.220$; $t(53) = -1.793$, $p = .079$), indicating the importance of interventions targeting the parent-child relationship in high-risk environments.

Effect of Sugar on Brain Peptides

Sarah Mitchell, CURO Honors Scholar
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College of Family & Consumer Sciences

The role of sweets and palatable foods within the context of the overweight and obese can be explored by examining the effect of fructose intake on orexigenic signals and hormones, such as ghrelin. Changes in the amount of ghrelin affects satiety and hunger levels, which can cause weight gain and even lead to obesity. Previous studies indicate that fructose may cause an increase in ghrelin levels that other sugars do not. Our main objective is to see what difference there is between the effects of dextrose and fructose on ghrelin levels. We are looking at how different sugars affect ghrelin levels in rats over a twelve week period, using three groups of rats and the sugars dextrose (a mixture of sucrose and glucose) and fructose with one control group. During the study, we measured the weight fluctuations and food intake over the twelve-week period. We harvested brain tissue to determine via immunohistochemistry changes in ghrelin receptor activation. This information will lead us to more knowledge about the effects of fructose versus other sugars on brain peptides regulatories of consumatory behavior. The interactions between our diet and ghrelin might lead us to develop new strategies to prevent overeating and more effective weight management therapies to treat obesity.

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Insecure Attachment, Low Self-Esteem, and Low Parental Warmth as Predictors of Substance Abuse

Hannah Muetzelfeld,
Grace Cha

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Given the increasing rate of marijuana use and the consistently heavy alcohol abuse among college students, and the resulting societal impact (e.g., Pentz, 1999), an empirical investigation of risk factors and predictors of such abuse is imperative. Previous studies have demonstrated a relationship between marijuana and alcohol abuse and both low self-esteem (e.g., Donnelly, Young, Pearson, et al., 2008) and parental warmth (e.g., Johnson & Pandina, 1991). To expand on this existing research, the present study explores insecure romantic relationship attachment in addition to parental warmth and low self-esteem, and their potential relationship with marijuana and alcohol use. This broadens an idea used by Kassel, Wardle, and Roberts (2007), in which it was proposed that adult attachment style plays an influential role in the prevalence of drug use, in addition to self-esteem and parental variables. It is hypothesized that low self-esteem, low parental warmth, and insecure attachment styles will all account for a significant amount of variance in both alcohol and marijuana use. To examine these relationships, self-reports from 342 college students were collected. Simultaneous regression analyses revealed that the model significantly predicted substance use ($t = 2.23$, $p < .01$). In terms of the individual relationships between independent variables and substance use, only parental warmth predicted substance use ($t = -.346$, $p < .01$). Together, these three variables contributed 22.3% in shared variability.

Prospect Theory and Common Action Problems: Loss Aversion in International Riparian Treaty Compliance

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Franklin College of Arts & Sciences

This paper attempts to apply cognitive science findings on loss aversion to identify best practices for treaties governing common pool resources. Prospect theory demonstrates that decision-makers are loss-averse: decision-makers overvalue losses relative to comparable gains. Consistent with this finding, international treaties governing common pool resources should achieve greater compliance when they are structured to provide an immediate gain (commons protection treaties) than when they demand an immediate loss (public goods treaties). This paper will test this hypothesis through regression analysis on an adapted version of the Transboundary Fluvial Dispute Data set. In the interest of maintaining an interdisciplinary perspective, these findings will be analyzed in the context of anthropological literature on common action problems and riparian politics. The findings could suggest more effective structures for treaties governing international rivers specifically, and common pool resources generally.

Measuring Transformational Leadership in the NFL

Aaron Murray
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College of Arts & Sciences

Transformational leadership has become a popular leadership style with several distinct characteristics. In theory, transformational leaders influence followers by raising follower self-awareness, establishing a sense of purpose and vision, and influencing followers to assume lower-order goals for the long term benefit of the organization (Bass, 1985). A myriad of research also suggests that

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transformational leadership leads to a variety of benefits for groups, such as creating more innovative teams, increasing behaviors that have positive contributions to team environments, and overall leading more effective teams (Keller, 1992, 2006; Piccolo & Colquitt, 2006; Podsakoff & MacKenzie, 1997; Judge & Piccolo, 2004). Although few would debate the strong influence of leadership in professional sports, research is lacking as to the measurability of such leadership characteristics among this unconventional demographic. Our study hopes to analyze the key behaviors of transformational leadership in quarterbacks from the National Football League. Specifically, we hope to construct and test a behavioral coding system to measure levels of transformational leadership among these team leaders. In order to test this, we will develop our coding system based on assessment center methodology, which research has found to be sufficiently valid (Klimosky & Strickland, 1977). Using archival data from past seasons in conjunction with game footage of starting quarterbacks, we will examine the effects of these transformational leadership behaviors on team success, as well as if situational factors play a role in the presence of such behaviors.

Gestational Diabetes Education Program

Amita Nawathe

Dr. Fazal Khan, School of Law

Gestational diabetes is one of the most common health issues that arise during pregnancy. It is currently estimated that 26 million American women have gestational diabetes. It is also estimated that one of every two to five women with gestational diabetes will develop Type II diabetes within a decade of giving birth. The rising epidemic of obesity, minority ethnic populations becoming the majority, and increasing levels of socioeconomic disparity make it more important than ever to analyze alternatives to the current system of delivering gestational

diabetes care. Through a thorough literature review and cost benefit analysis, this paper proposes that Georgia implement a Gestational Diabetes Education Program (GDEP) to help curb the problem of gestational diabetes. The GDEP will be funded both federally (Medicare) and locally (Medicaid) and will incentivize the creation of more primary care residency seats in rural and underserved areas of Georgia, the education of patients and the establishment of strong relationships between healthcare providers and patients. Implementing a state-wide GDEP can help prevent spending approximately 100 billion federal tax dollars on diabetes related costs over the next decade, while also helping residents of Georgia live healthier, happier and more fulfilling lives.

Post-Katrina Recovery Processes in the Vietnamese-American Community

Khai Nguyen

Dr. Steven Holloway, Geography, Franklin College of Arts & Sciences

The paper examines the recovery process of the Vietnamese community around the Gulf Coast in the aftermath of Hurricane Katrina. It focuses on cities with large Vietnamese populations such as Biloxi, Mississippi and New Orleans, Louisiana. Its framework is based on three major factors: intra-member relationships within the Vietnamese community as well as external interactions with the African-American community, the news media portrayal of the recovery and rebuilding process, and broader implications for federal disaster management. In addition to academic journals, the paper relies on sources such as newspaper articles, available census data and statistics from interviews with NGOs, to evaluate federal intervention as compared to community-based assistance. This study will also attempt to track the migration trends of evacuees from the Gulf Coast to urban areas around the US which contain significant Vietnamese populations (i.e. Houston, Texas and Atlanta, Georgia).

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Preliminary research finds that the federal handling of disaster aid, by not taking into account the historical background of marginalized minorities and the geographical importance of communal support, exacerbated the fragmentation of communities. The model minority myth, which overstates the speed and success of the recovery of the Vietnamese community, was reinforced by the media. This ultimately interfered with allocation of disaster aid at the expense of black Americans and caused the notable cooperation between the two communities to go largely unacknowledged. It is therefore irresponsible and counterproductive to advocate for self-reliance in disaster recovery because help does not go to the people and places that need it most.

Assembly and Subspeciation of Haptoglobin-Related Protein Containing High-Density Lipoproteins

Tuiumkan Nishanova

Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The purpose of this research is to define the mechanisms of High-Density Lipoprotein (HDL) subspeciation. Specifically, we are seeking to understand how the retained N-terminal signal peptide of Haptoglobin-related protein (Hpr) mediates association and distribution of Hpr amongst HDLs. We propose that HDL lipid fluidity affects the ability of signal peptides to associate with HDLs. We have addressed the first question by performing HDL-binding studies with native Hpr and recombinant Hpr that lacks the N-terminal signal peptide. To study how HDL fluidity affects the ability of apolipoproteins with retained signal peptides to associate with HDLs, we have utilized a model system in which we can modify liposome fluidities and observe how Hpr interacts with each of the liposomes. We show that the retained signal peptide of Hpr is

necessary and sufficient to associate Hpr with HDLs. We also show that HDL fluidity affects HDL- association of apolipoproteins with retained signal peptides. We found that liposomes with lower fluidities have tighter binding with Hpr, while liposomes with higher fluidities have faster binding with Hpr. It is significant to understand how HDLs assemble and factors affecting this assembly process because it will help us determine the best ways to treat patients with disorders, for example cardiovascular and metabolic diseases, where the levels and or composition of their HDLs are affected.

Protein Purification, Crystallization, and Functional Annotations of Five Essential LysR-type Transcriptional Regulators in *Acinetobacter baylyi* ADP1

Melesse Nune, CURO Scholar Graduation Distinction

Dr. Cory Momany, Pharmaceutical & Biomedical Sciences, College of Pharmacy

There are over forty LysR-type transcriptional regulators (LTTRs) in *Acinetobacter baylyi* ADP1. Five of the LTTRs in *A. baylyi* are essential under defined growth conditions (Database of Essential Genes <<http://tubic.tju.edu.cn/deg/>>). These five essential LTTRs are ACIAD0461, ACIAD0746, ACIAD2511, ACIAD1539, and ACIAD2384. Only ACIAD2384 has homology to an LTTR with known function, MetR, which controls methionine biosynthesis in bacteria. *Acinetobacter baumannii*, a closely related organism to *A. baylyi*, is a multidrug-resistant pathogen that kills tens of thousands of hospital patients each year and is considered an emerging threat. The essential LTTRs in ADP1 are present in *A. baumannii* and thus may represent novel antibiotic targets for drug discovery in the pathogen *A. baumannii*. Studies have been initiated to better characterize these essential LTTRs. The genes have been cloned into an expression plasmid that adds a polyhistidine C-terminal purification tag for simple protein purification

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from *E. coli*. Successful protein purification using metal-chelate chromatography has transitioned to crystallization studies. Bioinformatic analysis (evaluation of shared synteny and multiple sequence alignments) and functional studies (EMSAs) are being used to identify the regulated metabolic targets. The structural and functional studies done on these LTTRs will improve our understanding of microbial metabolism and transcriptional regulation and may provide avenues to develop new classes of antibiotics.

Modeling Subtelomeric Growth and the Adaptive Telomere Failure Hypothesis

Farres Obeidin, CURO Summer Fellow
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In many organisms, subtelomeric regions, the sequences near the ends of chromosomes, have a variety of features including an abundance of duplicated sequences, epigenetic silencing of genes, very high rates of evolution, and enrichment for genes involved in rapid adaptation to novel environments. These features are due in large part to a greater tolerance of subtelomeric regions to recombinational exchanges. The adaptive telomere failure hypothesis proposes that telomeres may have evolved to partially fail at a certain rate in some or all conditions to accelerate recombinational exchanges in subtelomeric regions. To determine the viability of this hypothesis, we constructed a Mathematica model to simulate evolution of individuals in environments with varying degrees of selection. This selection acts on a class of genes known as contingency genes. The model follows an organism through a set number of generations, recording the genomes of each individual and the number of contingency genes in subtelomeric regions at each time step in relation to the total number of these genes. Subsequent additions to the model allowed for increased recombination near the

telomeres, an effect of telomere dysfunction, to address whether a high rate is favored in a population undergoing selection on contingency genes because of an inherently higher ability to rapidly alter gene dose. Data from these simulations will most directly examine the adaptive telomere failure hypothesis.

Truth in Labeling: Nutritional Value Under NLEA

Philip Oldham
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Obesity rates are climbing and the health risks associated with obesity are alarming. Providing consumers with nutritional content such as fat, sugar, and salt has become increasingly important to combat this health epidemic. Nutrition labels are the primary method by which consumers account for nutrient content. Food labeling policy, however, has not been addressed since the Nutrition Labeling and Education Act of 1990 despite the increased complexity of food over the past two decades. Research suggests that consumers find it difficult to understand current labels and that there are more effective ways to display nutrient content for consumers. To better understand consumers' ability to interpret nutrition labels, this study convened a focus group of consumers who provided feedback on the use of new tools that clarify the nutritional value of food products. I expect the results to indicate that food labels are more comprehensible when the nutrient content is displayed graphically and in color. These data have important implications for consumer policy. In understanding what consumers comprehend, policymakers can shape labeling policy to reduce the asymmetry of information between consumer and producer in the food market.

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Development of Disability Awareness Assessment Scale

Andrea Orton,
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Enhancing social awareness of individuals with disabilities is important among students at UGA in contributing to their education. The purpose of this study was to test version 1 of a disability awareness assessment scale. A 34-item scale was developed, and IRB approval was granted to use this scale at the beginning and end of an academic semester. The questionnaire included 16-items with a 1-5 range focused on disability awareness, and 16-items with a 1-5 range focused on drug use in sports. Participants were recruited from two freshmen First Year Odyssey seminar (FYOS) classes. The disability group consisted of freshmen students in a First Year Odyssey course on disability awareness ($n = 5$). The control consisted of freshmen students in a First Year Odyssey course on Drugs and Sports ($n = 13$). The test scores on the questions related to disability awareness were 49.0 ± 5.6 pre and 51.0 ± 2.7 post class for the experimental group and 40.4 ± 4.2 and 41.6 ± 4.8 for the control group. The disability class had higher awareness scores than the control group ($p = 0.001$). However, there were no differences between initial and final scores in either group ($p = 0.231$). The results suggest that students selected the disability course based on previous knowledge and experience with individuals with disabilities. The lack of change in the disability awareness scores in the disability group suggests that the test battery was not sensitive to change, as by self-report, the students reported significant increases in disability awareness and a high degree of satisfaction in the course. Future studies are needed to test more participants, in particular students with low scores on disability awareness prior to a disability awareness course.

Finite-Difference Time-Domain Investigations of Metamaterials

Elliot Outland, CURO Honors Scholar
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Metamaterials, artificially engineered materials possessing properties not normally found in nature, have a variety of applications, such as miniaturized antennas, superlenses, and cloaking devices. In order to put these novel materials to their best uses, it is necessary to understand how and why they work as they do. The finite-difference time-domain (FDTD) method is one way of achieving such understanding; by solving electromagnetic equations one time step at a time, one can gain information about the way that waves interact with the material in question for all future time-steps. Our research uses the MIT Electromagnetic Equation Program (MEEP) to perform FDTD calculations on the behavior of electromagnetic waves as they propagate through various metamaterials in comprised of nanostructures in different configurations. After we specify the material and geometric parameters and run the simulation, MEEP produces an output file from which we can obtain quantitative data about the light-material interaction. By analyzing these results, we can gain a better understanding of how the nanomaterial parameters and geometry affect the optical properties of the metamaterials; this will aid in the designing of new metamaterials with desired optical properties.

Affinity and Specificity Characterization of Fbs1 via Surface Plasmon Resonance and Glycan Array Screening

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Ubiquitin-mediated proteolysis of misfolded proteins occurs through the systematic cascade of three types of enzymes: an activating enzyme (E1), ubiquitin-conjugating

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enzyme (E2), and ubiquitin-ligating enzyme (E3). The SCF complex, comprised of Skp1, Cul1, Roc1/Rnx1 and a variable F-box protein, is a well-characterized ubiquitin-ligating E3 enzyme complex. Fbs1 (97-297) is a glycoprotein specific F-box protein which interacts with glycoproteins containing high-mannose oligosaccharides (N-glycans). Specifically, Fbs1 recognizes the internal diacetylchitobiose structure in N-glycans. Since the internal chitobiose of N-glycans in native glycoproteins is not accessible, denatured glycoproteins exposing the N-linked oligosaccharides serves as a signal which is recognized by Fbs1. The objective of this research is to characterize the affinity and kinetics of Fbs1 for denatured RNase B through Surface Plasmon Resonance (SPR) and to further investigate its specificity for related N-glycan structures via glycan array screening. Fbs1 is expressed and purified using an engineering pGEX-6P-1 plasmid. It is first expressed as GST fusion protein into E.coli BL21 (DE3) Codon Plus RIPL strain and purified using a GSTrap FF 1ml column through on-column cleavage of Fbs1 from GST by PreScission Protease cleavage at an engineered cleavage site. High purity Fbs1 is obtained through Size Exclusion Chromatography (SEC) and verified by SDS-PAGE, Western blot analysis, MALDI Mass Spectrometry (MS) and peptide MS fingerprinting through LC-MS/MS. SPR affinity and kinetic analysis of Fbs1 for target denatured RNase B containing a single N-glycan site indicates a disassociation constant (KD) of 13 uM and disassociation rate (koff) rate of $9.87 \times 10^{-3} \text{ s}^{-1}$. Additionally, the specificity of Fbs1 is further investigated by screening fluorescently labeled Fbs1 on glycan arrays provided by the Consortium for Functional Glycomics. These results will help determine the utility of Fbs1 as an affinity capture reagent for N-glycan bearing peptides and glycoproteins.

The Effects of Volume Removal on Values of Fractional Anisotropy

David Parker

Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Diffusion Tensor Imaging (DTI) is a form of Magnetic Resonance (MR) technology that allows for non-invasive characterization of brain anatomy by measuring the diffusion of water molecules within the brain tissues. DTI is especially useful for examining connectivity between brain regions and is a new analysis technique that will have important clinical relevance towards a variety of brain pathologies that affect the integrity of these connections. In order to quantify the degree of connectivity between brain regions, fractional anisotropy (FA) values are calculated based on the average magnitude and direction of water diffusion. During data collection, a common problem is that slight movements can cause artifacts among the many brain images that contribute to the average FA value, which compromises the data. Standard practice is to visually inspect the data and to eliminate images with artifacts. Our goal is to examine the effects of volume reduction (i.e. elimination of poor quality images) on FA. Quality diffusion weighted images (30 diffusion encoded directions) from a single subject were chosen from a larger study and used as a baseline. From these baseline images, we systematically altered the number of diffusion weighted directions that contributed to that image in order to examine the effect of volume removal on FA. By comparing a complete data set that has no artifacts with a data set that has had volume reduction, we hope to determine a reasonable threshold for the number of diffusion encoding directions needed to preserve the validity and quality of data.

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Investigating Post-Translational Modification and Activity of Zebrafish Glycosidases

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Zebrafish (*Danio rerio*) has emerged as a popular model organism to study human diseases including lysosomal storage disorders. In order to better understand the regulation and function of lysosomal hydrolases in this system, the activity and post-translational modification of specific glycosidases has been investigated using wild type and mutant zebrafish lines. A characterization of a novel beta-galactosidase enzyme with a pH optimum near neutral was conducted. The results show that this activity is tissue-specific, distinct from the lysosomal beta-galactosidase and does not depend on the presence of soluble co-factors. A potential role for this neutral glycosidase activity could be extracellular remodeling of cell surface sugar chains. The maternal deposition of N-acetylglucosamine-1-phosphotransferase, the enzyme responsible for initiating the addition of mannose 6-phosphate residues to lysosomal hydrolases, was also investigated. A mutant zebrafish line deficient in its gamma subunit was utilized for genetic and biochemical analysis. Following a series of genetic crosses, the embryonic activity of four glycosidases was measured at different stages. These experiments provide strong evidence for the maternal deposition of N-acetylglucosamine-1-phosphotransferase into zebrafish eggs and set the stage to explore the function of mannose phosphorylation in the development of oocytes and embryonic growth.

Cognitive Differences Between Objective and Subjective Memory Complaints

Anisha Patel

Dr. L. Stephen Miller, Psychology, Franklin
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Mild cognitive impairment (MCI) is a term used to define an older adult who has a deficit in a specific cognitive domain that is greater than expected for their age. This category includes problems with memory, language, attention, or reasoning. Recently, an area of contention has been whether objective and subjective memory complaints differ cognitively, which is of particular importance given subjective memory complaints are a requirement for MCI. My hypothesis is that older adults with subjective memory complaints would not differ from individuals without complaints. I suggested that personality factors may account for the complaints, particularly neuroticism which has been previously researched and seems to be an indication of memory loss. We evaluated 57 older adults aged 65-85 on several factors. Using the Immediate and Delayed memory scores from the RBANS, I conducted a two tailed Spearman correlation, a regression, as well as a t-test. I also completed a two tailed Spearman correlation and independent samples t-test to see whether the personality factors were related subjective memory complaints. I found that there is no difference in immediate or delayed memory between someone reporting a memory problem and someone who isn't. Interesting, personality factors did not account for the difference. This suggests subjective memory complaints may not need to be required in order to determine if a patient suffers from MCI. Further research must be done to verify what may be accounting for subjective memory complaints, given there were no memory performance differences or personality differences as I had expected.

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Stable Cell Line Engineered with shRNA Against TMPRESS2 Protease to Reduce the Infection of Influenza Virus

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The cleavage of hemagglutinin (HA) protein with the use of host cell protease is required for influenza virus to gain entry into the cell. Previous studies have found that TMPRSS2 protease plays a significant role in the infectivity of influenza virus. During this study Lentivirus was used for the insertion of shRNA against TMPRSS, Red fluorescent expression, Puromycin selection gene, as well as Doxycycline induction to create a stable cell line which can be tested to determine the role of TMPRSS in influenza infection. The cell line was passage through fluorescent cell sorter as well as Puromycin selection to create clone cell lines. Gene silencing was validated with the use of PCR which demonstrated that there was a significant difference in the level of TMPRSS2 between Doxycycline induced and non-induced clones. Upon induction with Doxycyclin, TMPRSS2 silencing RNA is produced which blocks the production of TMPRSS2 RNA. The blocking leads to a decrease translation of TMPRSS2 and without the protease activity of TMPRSS to cleave influenza hemagglutinin (HA), the infection of host cell is reduced. The assay results demonstrated that the induction of the clone does decrease the infection of influenza virus.

Reducing Costs and Maintaining Quality: Alternatives to Fee-for-Service in Federal Health Insurance Plans

Yiran (Emily) Peng, Ramsey Scholar

Dr. Phaedra Corso, Health Policy & Management, College of Public Health

The fee for service system (FFS), the current way federal health insurance programs reimburse physicians, encourages financial waste and lowers the quality of U.S.

healthcare. In 2009, the U.S. spent \$2.5 trillion or 17.3% of its annual gross domestic product on healthcare, ranking number one in spending compared to all other industrialized countries. Despite this large investment, the World Health Organization ranks the U.S.'s healthcare system 37th out of 191 countries in performance and quality. FFS exacerbates the divide between cost and quality in a few significant ways. Payment by service provides incentives for excess spending and fraud. This rise in spending leads to health inequities by denying care to those who cannot afford it. In addition, FFS is a barrier to integrated care in that it rewards individual procedures, fragmenting patients into separate symptoms. To address these problems, Medicare should implement a capitated system that integrates insurance companies, hospital systems, and provider networks to cut costs and improve quality. A cost benefit analysis, as well as a thorough literature review indicates that replacing the FFS payment schedule removes incentives for physicians to order unnecessary procedures that increase waste. Paying physicians at a fixed, capped rate curbs health costs by eliminating the incentive for unnecessary procedures and offers more affordable care. At the same time, HMOs increase spending regulation and reduce fraud. To improve quality, a capped and integrated system gives incentives to hospitals, physicians, and insurance companies to collaborate and better serve their patients. Although the U.S.'s overall spending on health care will not dramatically change under this new policy, patients will receive increased quality per dollar under a capitated system, ultimately reducing the disparity between spending and quality-care in the U.S.

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Narcotics-Trafficking, Cloudforests, and a Killer Fungus: Amphibian Conservation in Central America

Todd Pierson

Dr. John Maerz, Warnell School of Forestry & Natural Resources

Amphibians are the most threatened group of vertebrates, and the highlands of Central America are home to one of the greatest diversities of salamanders worldwide. In addition to the ubiquitous effects of deforestation, an epidemic fungal infection—chytridiomycosis—has led to the extinction of dozens of species in the region. Despite great losses in the amphibian diversity of neotropics, the number of nominal species continues to increase as taxonomic studies reach their maturity. In the last sixteen months, I have joined the Museum of Vertebrate Zoology of the University of California Berkeley on three expeditions to Guatemala and Honduras to search for new species of amphibians, assess the status of remaining forest, and plan for the conservation of these threatened species. Here I present the results of these expeditions, a complicated success story of conservation in the Sierra Caral, and a plan for future conservation.

Arabian Nights: Preliminary Survey of Herpetofauna and the Phylogeography of *Bufo dhufarensis* (*Bufo*) in Oman and the United Arab Emirates

Todd Pierson

Dr. John Maerz, Warnell School of Forestry & Natural Resources

Amphibians and reptiles of the Arabian Peninsula are composed of groups of both African and Asian origin and previous phylogeographic studies have revealed radically different histories for different taxa. I spent six weeks in June and July 2011 collecting herpetofauna from Oman and the United Arab Emirates on an expedition with the Museum of Vertebrate Zoology. We

collected more than 300 specimens of more than 45 species, including both amphibian species of this arid region—*Bufo arabicus* and *Bufo dhufarensis*. The latter species is of particular interest, as its affinity for oases creates a highly disjunct geographic range across the region, and further analysis of interpopulation genetic variation may reveal some cryptic diversity. Here, I present a summary of previous herpetological phylogeographic research done in the region, the results of our 2011 expedition, and outline a phylogeographic study of *Bufo dhufarensis* that I will conduct in the summer of 2012.

Regulation of the Cell Cycle in the African Trypanosome by Small Molecule Inhibitors and Serum Deprivation

Daniel Pique, CURO Scholar Graduation Distinction

Prof. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts & Sciences

Human African trypanosomiasis, a disease caused by the protozoan *Trypanosoma brucei*, lacks safe and effective treatment options. Cell-permeable molecules can serve as lead anti-trypanosome chemicals or tools for cell cycle studies. Current protocols for *T. brucei* cell cycle synchronization use hydroxyurea to arrest in S phase. Herein, we present a new serum deprivation protocol that arrests trypanosomes at G1, as verified by two independent methods: flow cytometry evaluation of DNA content per cell and organelle duplication analysis by microscopy. Trypanosomes lack epidermal growth factor receptor (EGFR) and vascular endothelial growth factor receptor (VEGFR). However, we discovered that AEE788, a small molecule that inhibits EGFR and VEGFR tyrosine kinases in human cells, blocks Tyr phosphorylation in the trypanosome and arrests *T. brucei* in G1. Since *T. brucei* lacks EGFR and VEGFR, we used chemical proteomics approaches to identify three novel protein kinase targets of AEE788. With AEE788 and serum-deprivation both

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arresting at G1, the possibility of synergism between the drug and serum factors was explored. Surprisingly, serum-starved trypanosomes are no longer susceptible to AEE788 inhibition. We present a new hypothetical model that links a serum factor to AEE788-susceptible protein kinases in regulation of the trypanosome cell cycle.

Aporetic Structure in Marcel Proust's *In Search of Lost Time*

Sarah Potter

Dr. Andrew Zawacki, English, Franklin College of Arts & Sciences

By researching works of literature, theory, and criticism by Georges Bataille, Maurice Blanchot, Roland Barthes and others, I will investigate an aporetic structure—an impasse that is inherent in the nature of a situation or being—recurrent throughout my primary source, Marcel Proust's *In Search of Lost Time*. For Proust, nothing is truly experienced because of an aporia of presence and time. An event is not realized until experienced a second time, in a reincarnation that imparts meaning to the original experience. The latter becomes real by its dependency on this secondary experience, when Proust cannot be present for the original. While the essence of the first instance is preserved, Proust witnesses it outside of its place in time. He is torn between living in the present, building experiences without perspective in time, and reiterating his past to gain significance. This aporia futures capacity for experience, since it requires an impossibility in time. Applying this structure to experiences of color, travel, architecture, romantic love, writing, and more, Proust's narrator replicates a series of "little deaths," or limit experiences, that mimic the grandest iteration of aporetic experience: one's own death. Knowing one's death is impossible, for the moment it takes place, one is no longer present. This thesis will define the limit experience and nature of Proust's aporias before proving this structure and its fundamental importance across themes and

dynamics threaded throughout Proust. I hope that my findings will cast new understanding on Proust's work and its nuances.

Finding the Child in Children's Literature

Lea Rackley, CURO Summer Fellow

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As a child of twelve I was disengaged not just from school, but also from the world and its possibilities as I saw them. Coincidentally, the child protagonists of the books I read were similarly disengaged. As an English Education major, I have wondered how I might have responded, at twelve, to portrayals of children not stereotypically disengaged but enamored of the world. In this autoethnographic study, I draw on experiential knowledge to consider the importance of how literature is chosen for children—with particular consideration of their individual needs—both within the classroom and outside of it. I compare various portrayals of the child protagonist throughout world children's literature, examining their orientations to issues identified as fundamental to the emotional and developmental needs of children. I consider the child portrayed as recognizing love as responsibility, the child seeing loss, fear, grief, and sorrow as enabling growth, strength, and endurance, and the child seeing learning not as compartmentalized within the classroom, contained within homework, but inseparable from the child's world. By contributing to the discussion about children's literature from this interdisciplinary perspective, and by suggesting standards upon which works are chosen for students, I also hope to contribute to thinking about the way children's literature is taught. With children's emotional and developmental needs as the primary focus of my work, reading, and analysis, this study looks for works that help children see themselves and their strengths more clearly.

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Predictors of Tick Burden and Engorgement in Grant's Gazelle

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Ecology

Despite the negative effects of tick infection and the widespread distribution of ticks in African ungulates, very little is known about the factors that affect patterns of tick infestations in this group of hosts. Our study examined possible predictors of tick burden and engorgement rates in the Grant's gazelle (*Nanger granti*). We captured 61 gazelle at the Mpala Research Centre, Kenya in June 2011; and sex, age, body weight, body size (body length and neck circumference), overall tick burden, and number of engorged ticks were assessed for all individuals. We found that females and younger animals had a higher average tick burden than males and older individuals. Body weight was negatively associated with tick burden, while body size was positively associated with tick burden. Body weight and body size were also significantly correlated with the proportion of engorged ticks, whereas sex and age had no significant effect. Our results support previous studies examining tick infestations in small mammals, which show that tick burden typically increases with body size. On the other hand, the negative correlation between body weight and tick burden may reflect the effect of body condition rather than size. Our results also suggest that body size and weight may affect tick engorgement. Overall, our study contributes to a better understanding of the relationship between intrinsic host factors and tick parasitism.

Relations of Substance Use to Constructive Communication and Sexual Violence in Young Adults' Romantic Relationships

Michael Rausher,
Isabel Cohen
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The present study aims to better identify the relations between marijuana use, communication patterns, and interpersonal violence in young adults' dating relationships. Research suggests substance use may contribute to negative relationship outcomes and impact adults' abilities to form and maintain romantic relationships (e.g., Fals-Stewart, 2003). Additionally, current research indicates substance use may serve as a proxy for other deviant behaviors (e.g., Kilpatrick et al., 1997). While evidence supports relations between alcohol use, cocaine use, and sexual violence, less is known about if, how, and to what extent marijuana use may relate to interpersonal communication and sexual violence in college students' romantic relationships (e.g., Fals-Stewart, 2003; Ramisetty-Mikler et al., 2007). This paucity of information is important considering marijuana is one of the most readily available and frequently used drugs on college campuses. The present study utilized a sample of 62 undergraduate dating couples. Marijuana use was defined as reporting using marijuana three or more times during your life. Results indicate that there are significant differences between marijuana users and non-users regarding self-reports of Constructive Communication, measured by the CPQ, $t(60) = 2.98, p = .004$, and self-reports of perpetrated sexual violence, measured by the CTS, $t(60) = -2.90, p = .005$. Future research should explore the possible mechanisms through with the relation between marijuana and interpersonal violence functions.

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Haemogregarines of Freshwater Turtle Species: Does Basking Behavior Influence Parasitemia Levels?

Luben Raytchev, CURO Summer Fellow
Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

Haemogregarines are intracellular blood parasites of freshwater turtles. These parasites are considered nonpathogenic and are transmitted by leeches. Although common, many aspects of the parasite-host relationship have yet to be elucidated. This project seeks to compare the parasitemias of haemogregarines among common species of freshwater turtles. We hypothesize that behavior (basking vs non-basking) will influence parasitemia levels with baskers having lower numbers of parasites. Turtles were trapped and bled at numerous locations in Georgia (Baker Co., in South Georgia and Clarke and Madison Cos., in North Georgia) and various ponds in Ingham Co., Michigan. In total, 90 turtles of 10 species from Georgia and 94 turtles of 5 species from Michigan were tested. Thin blood smears were made, fixed in methanol, and stained with Giemsa. Smears were analyzed under a light microscope (100x) to determine 1) whether haemogregarine parasites were present and 2) the parasitemia level within each turtle (based on number of infected cells per 7,000 cells examined). To date, no differences were noted in the parasitemias detected in Georgia or Michigan turtles, in general ($p = 0.338$), or by basking behavior (baskers, $p = 0.2766$; non-baskers, $p = 0.3382$). In contrast, significantly higher parasitemias were noted in non-baskers compared with baskers (Georgia and Michigan combined, $p < 0.0001$; Georgia only, $p = 0.004$; Michigan only, 0.003). These results indicate that basking behavior has a significant impact on the haemogregarine parasitemia levels in turtles. Currently it is unknown if basking reduces parasite burdens by limiting exposure to leeches or by increasing the immune response of the host.

Does Eggshell Pigmentation Reflect Female Condition in Broiler Breeder Hens?

Chelsea Renier
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Brown eggshell pigmentation varies substantially among chicken eggs and is generated by the pro-oxidant protoporphyrin, a metabolite intermediate formed during the biosynthesis of heme. Protoporphyrin can cause oxidative stress damaging cells and tissues, creating reactive oxygen species, and inhibiting antioxidant systems. The hen's ability to sustain high levels of protoporphyrin in the blood for deposition into eggshells may convey information about female condition. Due to the costs of protoporphyrin generation and deposition, a positive correlation might be expected to exist between female condition and egg color. To test this, six consecutive eggs were collected from each of thirty-one broiler breeder hens and colors were analyzed using a 10 megapixel digital camera and Adobe Photoshop software. During the period of egg collection, the condition of each hen was assessed through weighing, tarsus length measurements, and blood collection for subsequent analysis of circulating levels of corticosterone (a stress hormone), heterophil/lymphocyte ratios (a measure of stress and immunity), and total antioxidant capacity of blood. Condition indices were then related to average measures of hue, saturation, and brightness to determine whether darker egg colors reflect better female condition. We predicted that hens laying darker eggs would weigh more, have lower stress indicators, and a better antioxidant capacity. Results may help determine hen quality in the poultry industry.

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DNA Hybridization in the Presence of Single-Walled Carbon Nanotube/ssDNA Complexes

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Single walled carbon nanotubes (SWNTs) are cylindrically shaped carbon molecules that have exceptional structural, electrical, and thermal properties. Due to their unique characteristics, SWNTs may form reliable and efficient biosensors for proteins, sugars, and DNA. Single stranded DNA (ssDNA) readily binds to SWNTs because the positively charged base pairs on the DNA are attracted to the loosely bound sp² hybridized electrons in a SWNT. Due to this electrical interaction, DNA unwinds and wraps around a SWNT, allowing the nanotube to act as a mediator during the formation of double stranded DNA. The DNA/SWNT complex not only allows for SWNTs to readily dissolve in water, but also enhances the detection of DNA using Raman spectroscopy through surface enhanced Raman scattering (SERS). The DNA/SWNT complex is formed by adding ssDNA to a solution of dispersed SWNT in sodium dodecyl sulfate (SDS). The SDS was later removed through dialysis. After binding was detected by UV-Vis spectroscopy, the complementary strand of ssDNA was added and allowed to hybridize to the DNA bound to the nanotubes. All unbound DNA was then removed from the solution using dialysis. The final suspensions were analyzed using UV-Vis-NIR spectroscopy. The suspensions were also deposited on copper nanoparticles for characterization with SERS. Once functionalized, the increased solubility and enhanced detection allow the DNA/SWNT complex to be an excellent biosensor which can lead to the more effective detection of early treatment of diseases such as diabetes and Parkinson.

An Examination of Communication and Employee Engagement

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The present study seeks to examine the relationship between management communications and employee engagement. More specifically, we propose to focus on manager relations as a mediating variable in the relationship between communication and engagement. The current literature on organizational leaders and perceived organizational support provide a theoretical background for the relationship between communication and manager relations. As salient representations of the organization, leaders play an important role in establishing perceived organizational support through giving meaning to organizational activities (Baranik, Roling, & Eby 2009; Cherniss, 1995; Drath & Palus, 1994; Smircich & Morgan, 1982). Utilizing literature from Blau's (1964) social exchange theory support can be found for the relationship between manager relations and engagement. The present study sample includes 2,557 participants from a large Fortune 50 company. From these participants, we will compare the nature of the mediated relationship for both managers and non-managers.

Combatting Obesity by Eliminating Food Deserts in Athens-Clarke County

John Rodriguez
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Athens-Clarke County mirrors the rising trend in obesity seen at national and state levels. From 2004 to 2008, the adult obesity rate in Athens increased from 24.7% to 27.1%—a rise of 10% in just over four years. Excess body fat is detrimental to individuals and societies, fostering chronic health conditions and causing higher annual medical costs. More

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and more, research and policy interventions are targeting community-level environments as a way to address the persistence of obesity. Of particular importance in Athens-Clarke County is the food desert, which is any low-income tract where a high percentage of individuals face limited financial and geographical access to a full-service grocery store. Approximately 20% of the Athens population lives in such conditions, relying on convenience stores that do not provide for an adequate, balanced diet. This project attempts to analyze the shortcomings of current policy in Athens-Clarke County to combat rising obesity rates. It draws on literature examining community-wide intervention obesity initiatives, supplementing it with expert opinions from Athens officials. The project proposes three possible courses of action to eliminate food deserts as a method of combatting obesity in Athens-Clarke County: (1) implementing farm to school programs; (2) funding a mobile farmers market; and (3) expanding community gardens. After a multigoal (effectiveness, cost, feasibility) analysis, the research concluded that a combination of farm to school programs and a mobile farmers market would be the best policy to decrease the obesity trend and encourage healthier lifestyles.

No Triumph Without Loss: Problems of Interracial Collaboration in Tolkien's Works

Hope Rogers, CURO Summer Fellow, CURO Scholar Graduation Distinction
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Tolkien peopled his fantastic world of Middle-earth with various races, from Elves and Dwarves to Hobbits and Men, and further subdivided those races into different ethnicities and cultures. Although many critics have discussed Tolkien's races, few have taken a comprehensive look at them from a real-world perspective, and still fewer have gone beyond praising Tolkien's celebration of

diversity to explore the loss that accompanies it in his stories. Through an exhaustive study of Tolkien's works and letters, as well as relevant criticism, this study examines how the interactions of Tolkien's races relate to modern race issues. It focuses on his portrayals of the causes of conflicts and the problems that accompany other racial interactions, such as trade inequalities and acculturation. Tolkien uses Middle-earth as an arena to play out issues of prejudice, exploitation, and globalization and to explore possible responses as different as isolationism and intermarriage. He thus challenges readers to look at the ultimate consequences of such responses and to reevaluate supposedly ideal solutions. Far from being escapist fantasy, Tolkien's works have a unique relevance to the real world with their all-too-real pictures of the complexities of racial interactions.

The Skeleton in the Closet: Deadly Duplications in Mary Shelley's *Frankenstein*

Hope Rogers, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Michelle Ballif, English, Franklin College of Arts & Sciences

Pieced together from the bodies of men and beasts, the monster from Mary Shelley's *Frankenstein* has fascinated casual readers and critics alike. And of the many critics who have written about the novel, a small yet significant number have explored its themes of race and miscegenation, describing the monster as a racially Other or miscegenated being. These critics, however, have failed to notice the book's overriding drive for homogeneity that ultimately characterizes the monster not as the Other but as Victor's double. In my in-depth analysis of the novel, I first establish how the Frankensteins and other characters preserve the integrity of their homogenous community and prevent contamination by difference by constantly duplicating themselves, absorbing and thus effacing difference through semi-incestuous

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relations and assimilatory practices. These doublings threaten the Hegelian dichotomy between Self and Other, in which the Self can only exist by being defined against an Other. This threat is realized in Victor's unnatural creation of the monster, his perfect double, which totally destroys the Other, breaking the dichotomy and resulting in the death of Self, a consequence acted out through the monster's murders. Shelley's novel is thus a tale not of difference, racial or otherwise, but of the destructiveness of forced homogeneity, a reading that both highlights the novel's complexities and provides a forceful reflection on our own world.

The Implementation of Effective Smoking Cessation Interventions for Drug and Alcohol Addicts in Substance Abuse Treatments

Mark Rolfsen, CURO Summer Fellow
Dr. Jessica Muilenburg, Health Promotion & Behavior, College of Public Health

The prevalence of smoking among individuals in substance abuse facilities is very high, between 70%-95%. However, only 51.3% of drug treatment facilities in this study offered either medication or counseling for nicotine dependence. Previous research demonstrates that addiction to nicotine may affect the brain in a way that decreases the chance of prolonged sobriety. Understanding what characteristics of treatment facilities allow them to most effectively implement smoking cessation practices would be highly cost effective versus the alternative of dealing with patient relapses. The study that I worked with conducted telephone interviews with 850 directors of substance abuse facilities. I looked at two aspects of these interviews: factors that might influence a facility's likelihood of offering smoking cessation, and factors that are associated with a strong attitude towards smoking cessation. Three factors- staffing, training, and financials -were measured using questions

answered on a 5-point scale. Out of these three areas, financials was the only factor that had a significant correlation ($p < .05$) with the prevalence of a smoking cessation program. Likewise, program director attitude was measured on a 5-point scale. Neither recovery status, time in the field, nor educational level had any correlation with a director's attitude towards the effects of smoking cessation on sobriety. However, the majority, 67.4%, of directors felt that smoking cessation increased a patient's chance of sobriety. Further analysis of which factors are important in implementing smoking cessation practices will hopefully yield higher levels of nicotine treatment, and therefore enhance the nation's ability to promote prolonged sobriety.

Architecture and Dress

Meghan Russell
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& Consumer Sciences

My research investigated how architecture and dress (defined as modifications and supplementations to the body) are related, beyond both being essential for human survival. In order to explore modern collaborations between architects and designers, I closely studied art exhibits and investigated scholarly projects and ideas of fashion designers whose designs emulate architecture. From my research, I concluded that space and the way it is connected to the human body is the main driving force that links architecture and dress. We as humans not only conceive space as our environment in which we are located, but also view our bodies as our personal space. We wrap ourselves in clothing and enclose ourselves in a room within our homes or public buildings in similar ways. Both architecture and dress help us stay protected from the elements or the mocking of societies that often harshly judges the human form.

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The Resistance Complex in Lyon: Politics, Memory, History

Kayci Schoon

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Considering the essential role of the city of Lyon in the French Resistance, surprisingly little has been written specifically on this subject. The French Resistance movement and occupied France have been contentious topics ever since the release of Robert Paxton's *Vichy France: Old Guard and New Order*, which tore down decades of denial about France's collaboration with Germany. Lyon, as "the Capital of the Resistance," was Charles de Gaulle's base for the movement, placing Lyon's activities and prime résistants at the center of France's Gaullist myth – the idea that France was a nation of heroic résistants. This myth was useful for inspiring national unity and popularizing de Gaulle, but it also seeped its way into historical studies and memoirs, producing many misunderstandings about the nature of the Resistance. My goal is above all to demonstrate the true complexity of the Resistance in Lyon – that it did not comprise simply Lucie Aubrac and other idealized non-Jewish liberals, but it included Catholics, Communists, Jews, as well as a variety Gaullist movements, that struggled to reconcile their differences. When achieved, unity often meant to ignore their differences at the cost of nuance and accuracy, as is reflected in the language of Gaullist clandestine newspapers and de Gaulle's vague speeches. I also demonstrate the breadth of the Lyonnais Catholic resistance movement, which has often been overlooked despite its significant achievements and drawbacks. In so doing, I hope to emphasize Lyon's role in the formation of the French Resistance myth, and how breaking down the myth through the Lyonnais paradigm will help us better understand the reality of the Occupation.

Progress Toward Sustainability Goals at UGA's Costa Rica Campus in San Luis de Monteverde, Costa Rica

Dana Schroeder, CURO Summer Fellow
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Ecology

Since its inception in 2002, UGA Costa Rica (UGA CR) in San Luis de Monteverde has operated under a business model that heavily emphasizes environmental, social, and economic sustainability. Hosting an average of 27 students, faculty, researchers, and tourists per night in 2010, this cloud-forest campus has been developed to protect the surrounding ecosystem, support the local economy, and immerse guests in the local culture. Progress toward sustainability goals is investigated and reported in an annual sustainability report. Documents including management plans, protocols, accounting records, and resource use data compiled for the *2011 Sustainability Report* show that UGA CR is meeting monthly targets for resource use in 10 months out of the year, 82.5% of waste is being diverted from landfills, and some organic waste is even being converted to cooking fuel in the campus's new biodigester. After interviewing staff and hosting departmental meetings to complete the Earth Charter Ethics-Based Assessment Tool, we have indicated potential areas for improvement. Specific focus could be placed on improving commitment to poverty eradication, expanding on-site renewable energy generation, and raising awareness for environmental issues through mass media. Indicating these areas for improvement and making recommendations for future initiatives will ultimately help UGA CR reach its goals listed in the *Vision for 2015*, earn a higher rating in the Certification for Sustainable Tourism, and set an example for the UGA community in Athens to incorporate more sustainable practices into its operations.

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Assessing Rce1-Protease Inhibition in a Cell-Based Fluorescence Ras Localization Assay

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Ras proteins function at the plasma membrane to induce several intracellular pathways, some of which are involved in cell proliferation. If the Ras gene is mutated to become constitutively active, cell cycle misregulation and rampant cell growth may occur, leading to tumorigenesis. In the second of three post-translational modifications to the Ras carboxy-terminus CaaX motif, Rce1p endoproteolytically cleaves the -aaX sequence after prenylation of the free cysteine thiol. Rce1p is an ideal target for Ras inhibition since it is a universal modifier of proteins in the Ras superfamily. Previous findings show that small molecule inhibition of Rce1p activity in *S. cerevisiae* causes Ras mislocalization, but investigation of inhibition in mammalian cell culture has not been conducted. Our study utilized a simple fluorescence-based cell culture assay to assess the ability of small molecule inhibitors of Rce1p to cause Ras mislocalization in mouse embryonic fibroblast (MEF) cells. We transfected both null (*Rce1*^{-/-}) and wildtype (*Rce1*^{+/+}) cells with a green fluorescent protein-tagged Ras isoform (GFP-KRas4B) plasmid construct as positive and negative controls, respectively, and observed the degree of Ras localization to the plasma membrane with fluorescence microscopy. A distinct, binary difference in phenotype between *Rce1*^{-/-} and *Rce1*^{+/+} MEFs was not initially observed, so we conducted a time-trial transfection and imaged cells under a confocal microscope at 24, 36, and 48 h. Our assay shows that the GFP-KRas4B construct is not ideal for studying Rce1p inhibition. Other GFP-tagged Ras family members, like GFP-Rnd3 and or GFP-RhoB, may be more suitable to quantify inhibitor activity.

Intravenous Minocycline and Its Effect on Peripheral Interleukin-6 After Ischemic Stroke

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Due to a favorable safety and pharmacokinetic profile, anti-inflammatory activity, demonstrated compatibility with t-PA, and efficacy in multiple pre-clinical stroke models, minocycline shows potential to improve therapeutic outcomes in ischemic stroke. In this early phase trial of intravenous minocycline in acute ischemic stroke patients, blood samples were collected to quantify the effect of minocycline on inflammatory biomarkers. IL-6 levels have been associated with stroke severity and clinical outcome. Following an open-label, dose-escalation design, minocycline was administered intravenously within 6 hours of stroke symptom onset in preset dose tiers of 3, 4.5, 6, or 10 mg/kg daily over 72 hours. Blood samples for biomarker analysis were drawn at 24 after symptom onset and analyzed using ELISA techniques. The effects of minocycline on interleukin-6 were subsequently compared to a historical control group and literature values of IL-6 in acute ischemic stroke. A statistically significant association was found between patients that received minocycline and non-detectable IL-6 levels, with patients receiving minocycline 7.16 times (95% CI 2.64-19.38) more likely to have a non-detectable IL-6 level than those patients that did not receive minocycline. In conclusion, minocycline shows robust anti-inflammatory activity and prevents the rise in IL-6 levels due to ischemic stroke

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Proteomics Analysis of Canine Prostate Carcinoma Tissue: A Potential Animal Model of a Human Disease

Peter Sisk

Dr. Ron Orlando, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Animal models have often been used in cancer research due to neoplasms that exhibit similar characteristics to human cancers. Male humans and canines are the only large mammals that spontaneously develop prostate cancer, exhibiting a potential model for human prostate cancer. In this work, a GeLC-MS proteomics approach was used to identify protein expression from normal and carcinoma canine prostate tissue. Soluble proteins were extracted from tissue samples and analyzed using an Agilent 1100 LC system interfaced online to a Thermo-Fisher LTQ mass spectrometer. Resulting LC-MS/MS files were database searched via Mascot, with identifications analyzed using ProteoIQ software. DAVID bioinformatics software was used to determine biological significance of identified proteins. Previously published proteomic data used MALDI MS/MS to analyze only proteins displaying more than a 2.5-fold difference between carcinoma and normal tissue samples using 2-D DIGE spots, leading to only 9 proteins being analyzed. Using the GeLC-MS/MS strategy, all potential proteins were analyzed in the carcinoma and normal prostate samples. Preliminary data shows that 942 total protein groups were identified with 863 of the proteins overlapping between the normal and carcinoma samples. Using differential analysis, 69 proteins were found only in the carcinoma samples, while 10 unique proteins were found in the normal cells. All identified proteins will be run through DAVID Bioinformatics Resource to look for any biological pathways these proteins may be associated with.

Inferno

Daniel Smith, CURO Summer Fellow
Prof. Michael Marshall, Lamar Dodd School of Art

In his 14th-century masterwork, *Inferno*, Dante Alighieri describes a place where people exist entirely out of contact with God, having only each other and their own, self-willed damnation for comfort. In today's increasingly secular culture, Dante's *Inferno* retains a resonance less present in *Purgatorio* and *Paradiso*, precisely because the characters' utter isolation from God relates to contemporary culture's existential awareness. With the resources of a 2011 CURO Summer Fellowship, I investigated the literature and art surrounding Dante's poem to inform the creation of a large-scale, photographic illustration of the work. I quickly realized the difficulty in photographing the impossible images that I envisioned, and so I invented a method of photographic compositing emphasizing contemporary art techniques for contemporary audiences. The ultimate result of two semesters using this new method is "Inferno," a 5'x27", Last Judgment-themed photomural, illustrative of ideas and aesthetics in Dante's masterwork, numerous Italian and Northern European Renaissance artworks, and historic photographic practices. In my photomural I attempt to portray many of Dante's characters, while reinventing them and structuring my own vision of the world that they inhabit. This world is not merely relevant to the wicked but to all people. "Inferno" is more than a recapitulation of Dante's hell; it is a contemporary, human hell which tells the divine tragedy of man's story.

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Characterization of a Putative Endonuclease-RNA Complex Involved in CRISPR-Mediated Viral Defense

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Genomes are under the constant threat of deleterious alteration or disruption from exogenous genomic elements such as viruses, transposable elements, or plasmids. Consequently, evolution has led to the creation of defensive systems that function to protect cellular genomes from attack. One such system, the CRISPR-Cas System, discovered in prokaryotic organisms has the ability to not only silence invaders but also to acquire heritable immunity from genome invaders. My focus resides with a prokaryote that outlines a well-studied CRISPR-Cas system. This bacterium, *Streptococcus thermophilus*, has recently been shown to have the ability to acquire resistance to a number of bacteriophages through destruction of invader-derived dsDNA¹. The Cas protein, Csn-1, has been found to be required for this invader silencing, however its precise role in defense has yet to be determined. My goal is to determine the role that Csn-1 plays in defense of silencing invaders, possibly through direct cleavage of invader dsDNA and/or a potential role in the crRNA biogenesis. I will test the ability of Csn-1 to cleave invader-derived dsDNA using a crRNA guide to determine if Csn-1 functions in the Invader Silencing Stage of the CRISPR-Cas immune pathway. If catalytic activity is observed directly by Csn-1, the putative catalytic residues will be substituted through site-directed mutagenesis to assess whether these amino acids are required for catalysis as well as which predicted endonuclease active site is responsible for cleavage. Finally, to ensure the findings are physiologically relevant, I plan to reintroduce the mutant Csn-1 proteins into a mutant strain of *Streptococcus thermophilus* that lacks Csn-1, and

assess effects on crRNA biogenesis and invader (phage and/or plasmid) silencing. These findings will provide the first molecular details of CRISPR mediated silencing of invader-derived dsDNA.

1 Garneau J.E., Dupuis M., Villion M., Romero D., Barrangou R., Boyaval P., Fremaux C., Horvath P., Magadan A., Moineau S. (2010). The CRISPR/Cas bacterial immune system cleaves bacteriophage and plasmid DNA. *Nature* 468, 67-71.

Determination of Virulence Factors Associated with *Histomonas meleagridis*' Cause of Blackhead's Disease in Gallinaceous Birds

Matthew Smith
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Sciences

Histomonas meleagridis is the causative agent of Blackhead Disease in gallinaceous birds. It causes cecal inflammation and can spread to the liver leading to liver failure and death. This disease is known to have 80-100% mortality in turkey flocks. In a previous study, *H. meleagridis* was shown to lose virulence upon passage in culture suggesting a variation in pathogenicity that is also observed in the field. Our lab has identified potential virulence factors whose expression is lost upon passaging in laboratory cultures. To test the ability of these genes to cause disease, we are designing experiments to express putative virulence factors in a non-virulent strain of *H. meleagridis* via transgenesis. We are currently designing a transformation protocol specifically for *H. meleagridis*. My research project has been to design, generate and test this expression system. To do this, we cloned the *H. meleagridis* beta-tubulin promoter upstream of the neomycin resistant gene. A polyadenylation signal sequence was also cloned downstream of the neomycin gene to promote stable mRNA expression. Currently we are testing several electroporation

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conditions to assess the ability of this construct to confer resistance to G418. Upon successful transformation of *H. meleagridis*, we will generate new vectors that contain sequences encoding virulence factors in place of the neomycin resistance gene, and test their affect the pathogenicity of *Histomonas meleagridis* in turkeys. Virulence genes identified in these studies will be targets for future drug development and vaccine production.

Compelling State Interest: A Study of the Unequal Application of Strict Judicial Scrutiny

William Smith

Dr. Peter Hoffer, History, Franklin College of Arts & Sciences

The concept of judicial scrutiny surrounding the free exercise clause has created an extremely esoteric and controversial method for determining the outcome of particular cases in the Supreme Court. For centuries, Court Justices have struggled to find a procedure that effectively protects the free exercise of religion, while still maintaining the integrity of the federal and state legislatures. Eventually, the Supreme Court developed a balancing test known as “compelling state interest,” which would place the burden on the state to prove that the law in question was necessary to protect the state’s interest. Originally, this balancing test was widely accepted by religious and secular pundits, as it appeared to be a method designed primarily to protect religious rights while still allowing the state a process for overriding that right if necessary. However, this paper will discuss recent cases decided by the Court, which reveal that the justices do not use this balancing test objectively. Through the study of the justices’ opinions in two Court cases involving the rights of Christian interests, as well as their opinions in two cases involving the similarly exploited rights of Native American interests, it is apparent that strict judicial scrutiny is not applied equally. In this

paper I argue that law itself is not as impartial as it is often believed to be, and that the justices of the Supreme Court are often guided by the same economic interests and inherent racism the judicial system is designed to prevent.

The Science of Monitoring Rare Species: Developing Methods to Locate and Survey for the Endangered Bog Turtle

Theresa Stratmann, CURO Summer Fellow

Dr. John Maerz, School of Forestry & Natural Resources

North America’s smallest turtle, the bog turtle (*Glyptemys mublenbergii*), resides in the bogs of the eastern United States. Habitat loss and deterioration, as well as illegal collection for the pet trade, have resulted in this turtle being listed as Critically Endangered under the International Union for Conservation of Nature (IUCN) Red List. Cryptic and rare, it is extremely difficult to assess their population status. In addition, monitoring efforts are often done in a manner that cannot be used to estimate species detection rates, population abundance, or population viability. Time-effective methods of surveying for new populations are also largely lacking. To address these deficiencies several mentors and I are (1) developing a species distribution model (SDM) for the bog turtle to better predict where populations should occur, (2) determining the best methodology and minimal effort required to determine with confidence whether bog turtles are present at a site, and (3) testing the SDM and trapping methodology in South Carolina where bog turtles have not been seen in over a decade. Current analyses are based on what we have learned from a basic SDM and a season of mark/recapture data collected in Georgia using the new methodology. We hope this project will help state wildlife agencies in their efforts to conserve bog turtles. More generally, it is a case study that will contribute to designing robust monitoring of rare and cryptic species.

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Proteome Studies of the Interaction Between *Botrytis Cinerea* and Tomato Fruit

Andrew Suddreth

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Botrytis cinerea is a pathogenic filamentous fungus that infects more than 200 plant species, many of which are of agricultural interest. *B. cinerea* secretes enzymes that degrade pectin, a major component in plant cell walls. This study tries to identify what proteins are secreted by the fungus at different time points during the growth period by using pectin as carbon source. To do this, a model system was constructed. We prepared a liquid pectin media to culture *B. cinerea* and we used tomato fruit, a known plant that *B. cinerea* infects, as our agricultural crop of interest. The first part of the project will be the standardization of protein extraction using a model system (liquid media). Once the protein extraction protocol had been standardized, we could identify the secreted proteins from the interaction between tomato fruit and *B. cinerea*. The liquid pectin media was inoculated with *B. cinerea* and samples were obtained every 24 hours for seven days. We followed a protocol to concentrate the secreted proteins for analysis. The concentrated proteins were then subjected to TCA protein precipitation, Bradford protein assay, SDS-PAGE gel electrophoresis, tryptic digestion, mass spectrometry and database searching. Proteins were identified by using a target database created by combining the *B. cinerea* BO5.10 (Broad Institute, MA), and T4 databases (Genoscope, France). A decoy database was constructed by reversing the sequences in the target database. Statistically significant proteins were determined for all of the samples at a 1% protein FDR using ProteoIQ Software.

Measuring Chronic Ankle Instability in a Recreationally Active Population

Christopher Sudduth, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

After suffering a lateral ankle sprain, a significant number of people report residual symptoms such as pain, swelling, instability, and a feeling of the ankle joint “giving way” during activity. These recurring symptoms have been coined Chronic Ankle Instability (CAI). This definition is vague and does not empirically quantify the degree of ankle instability. The aims of this study were to establish the reliability of the LigMaster, an instrumented ankle arthrometer, in assessing ligament laxity and to characterize CAI by evaluating the relationships between ankle laxity and self-reported ankle function. Twenty-four participants had lateral ankle ligament laxity assessed using the LigMaster. They self-reported scores of ankle function using two questionnaires. Two testers measured ankle laxity on multiple days for a subset of participants. Intraclass correlational (ICC) values were calculated to measure the reliability of the LigMaster. Correlation coefficients were calculated to measure relationships between ankle self-report function and ligament laxity. ICC values ranged from 0.00 to 0.90 on the LigMaster. Significant correlation coefficients were found between lateral displacement and questionnaire scores ($R=-0.476$ and -0.506 ; $p<0.05$). The LigMaster can be considered a reliable tool between testers on a single day and within a single tester on the same day. However, reliability across days is low to moderate. As ankle instability increased, self-reported ankle function decreased, in a moderate relationship. It appears the LigMaster can be reliably used to measure ankle laxity, and increased laxity is associated with poorer ankle function.

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Pathogenesis of Chicken Astrovirus as Studied by In-Situ Hybridization

Lauren Sullivan, CURO Scholar Graduation Distinction

Dr. Corrie Brown, Pathology, College of Veterinary Medicine

The purpose of this study is to characterize the pathogenesis of disease caused by chicken astrovirus (CAstV). CAstV is a single-stranded positive-sense RNA virus reported to be a contributing agent in the runting-stunting syndrome (RSS) in broilers. Key features of RSS include diarrhea, delayed development, and increased mortality; however, little is known about the pathogenesis of the disease. For this study, chicken embryos were inoculated with CAstV, at 17 days of embryonation. The negative control group was inoculated with phosphate-buffered saline (PBS). Tissues were harvested at day of hatch (three days post-infection). In-situ hybridization was performed using a negative-sense digoxigenin-labeled riboprobe complementary to the polymerase gene of CAstV. In the CAstV-infected group, intestinal tissue from all infected birds demonstrated positive signal. Preliminary analysis indicates that the virus infects and replicates predominantly in the cells lining the sides of the villi.

The Interaction of Tau Proteins and Hirano Bodies

Connor Sweetnam, CURO Honors Scholar, CURO Summer Fellow

Dr. Marcus Fechtmeier, Cellular Biology, Franklin College of Arts & Sciences

Alzheimer's disease (AD) is the fastest growing neurodegenerative disease in the world and is characterized by memory loss, dementia, and difficulty in communication. AD has two hallmark pathologies, amyloid plaques and tau tangles. In addition, Hirano bodies are observed with AD. Hirano bodies (HBs) are actin-rich inclusions that occur in the brains of patients with neurodegenerative

diseases. Although the function of these pathologies is not known, tau- and beta-amyloids are linked to cell death. Mutant forms of tau are well known to contribute to cell death in diseases like Parkinsonism-linked frontotemporal tau dementia (FTDP). Hyper-phosphorylated tau increases cell death and may play a role in Alzheimer's disease as well as other tauopathies (diseases attributed to tau). Previous studies in the Fechtmeier lab show that Hirano bodies dramatically reduce cell death due to hyper-phosphorylated tau. These results and the fact that tau binds well to F-actin, the main constituent of HBs, have led me to ask whether tau affects Hirano body size and formation. In my experiments, H4 astrogloma cells were transfected with CT-GFP, a construct that induces HB formation, with and without mutant or wild type tau. Cells were examined using fluorescence microscopy, and images were analyzed to compare the different actin and Hirano body structures in a cell with or without tau. I have found that different forms of tau affect Hirano body size. This study enhances our understanding of the mechanism of how Hirano bodies protect against tau-induced cell death and contributes to our understanding of neurodegenerative disease.

Characterization of *cis/trans* Phosphorylation Modes in a Eukaryotic Protein Kinase

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Dr. Natarajan Kannan, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Most eukaryotic protein kinases are activated via phosphorylation of a residue in a loop called the activation loop, which allows the kinase to adopt an active conformation. Interestingly, some kinases are autophosphorylated, including the Aurora kinase, a protein involved in spindle formation. Mechanistically, autophosphorylation could be *trans*, where one molecule phosphorylates another, or *cis*,

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in which the same molecule is both substrate and enzyme. In order to determine the mode of autophosphorylation in the *Aurora* kinase, wild type protein was combined in solution with a kinase dead mutant and a phospho-Aurora antibody was used to check phosphorylation of the mutant. Lack of phosphorylation on kinase dead mutant suggested that the mode of autophosphorylation is not *trans*. *Cis* autophosphorylation is characterized by the rate of reaction being concentration independent. The *cis* autophosphorylation was examined by autophosphorylation levels in two different concentrations of *lambda phosphatase* treated wild-type protein. The preliminary data suggests that the kinase undergoes *cis* autophosphorylation. The current understanding of the activation loop phosphorylation is that it is part of a signaling cascade of kinases. However, because of the similarities of the *Aurora* kinase and its phosphorylation loop to other kinases, the fact that it undergoes *cis* autophosphorylation could be indicative of some other kinases undergoing similar mechanism. This would be important in the field of cancer, because some kinases could activate themselves and cause disease. Additionally, because the *Aurora* kinase is an oncogene, this *cis* autophosphorylation could lend insight into its malfunctions.

Social Media's Effect on the Arab Spring Revolutions

Stephanie Talmadge
Dr. Leara Rhodes, Grady College of
Journalism & Mass Communication

Social media has opened up a new realm of journalism, which has been particularly important for the countries of the Arab Spring Revolutions. In this study, the government overthrows in Egypt, Libya and Syria were examined to determine whether or not these events occurred before these three countries were ready to implement a more democratic form of government.

“Democracy” is defined by the presence of three factors: a strong leader, free elections, and an independent media where citizens can freely exchange ideas. I hypothesize that if the countries were not ready, social media would spur protesters to action, but the following revolution would be messy and not have a clear outcome. If the countries were ready, however, I posit that the revolutions would happen quickly, involving a smooth government ousting, and have a clear outcome. Newspaper articles were retrieved from the International Herald Tribune, The Daily New Egypt, Syria Today and The Tripoli Post using the key words “social media and uprising” between January 2011 and August 2011 to produce empirical data. Ultimately, I concluded that the implementation of social media could have caused the Arab Spring Revolutions to happen before Egypt, Libya and Syria were ready to receive democracy because the outcome in all three is still unclear and no obvious leaders have emerged.

Examining the Function of O-GlcNAc in Regulating Intracellular Signaling Pathways During *Drosophila* Development

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Sciences

The addition and removal of O-linked N-acetylglucosamine (O-GlcNAc) at serine and threonine residues is an essential regulator of intracellular signaling pathways. Like phosphorylation, O-GlcNAc modification acts to significantly alter the function of the protein to which it is attached. There has been considerable research documenting the functional implications of phosphorylation; such as acting as a regulator of cell growth and differentiation. Contrarily, the functions of O-GlcNAc are still being discovered and relatively little attention has been paid to the involvement of O-GlcNAc in cell processes.

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As with kinases and phosphatases, O-GlcNAc modification is controlled by regulated and compartmentalized enzymes; O-GlcNAc transferase (OGT) and O-GlcNAcase (OGA). Currently, it is impractical to study the function of O-GlcNAc in mammalian species because the loss of O-GlcNAc is lethal. However, the genetic tools provided by *Drosophila* allow us to examine the effects of increasing and decreasing O-GlcNAc levels in specific tissues. This project aims to better understand the function of O-GlcNAc by altering the expression of OGT and OGA within specific cells of *Drosophila melanogaster*. Our results indicate that diminishing the attachment of O-GlcNAc to intracellular proteins in engrailed-expressing cells reduces the amount of wingless protein the cells secrete. Coupled with previous preliminary analyses, now reproduced and optimized here, that revealed the loss of the entire posterior wing section in O-GlcNAc deficient wing discs, it is becoming increasingly clear that O-GlcNAc is essential for normal wingless signaling. Further research will aim to examine phenotypic penetrance in larval wing discs and quantify protein expression in both wing discs and embryos.

Teacher Evaluation Methods in Georgia Public Schools

Matthew Taylor

Dr. Sally Zepeda, Lifelong Education, Administration & Policy, College of Education

Students in Georgia's public schools are lagging behind the rest of the nation. According to the National Assessment of Educational Progress (NAEP), a nation-wide test of 4th and 8th graders, Georgia ranks among the bottom 15 states of the nation in reading and math. While numerous variables influence students' educational outcomes, the most important school-related factor is the quality of teachers.

In order to assess the ways in which teacher evaluation methods could be improved to increase the quality of teachers in Georgia's public schools, I reviewed relevant scholarly research and conducted interviews with education scholars and policy experts. Over the course of the research, it was discovered that the current system of Georgia Public Schools identifies very few ineffective teachers, does not incentivize good teaching, and does not have accurate information on which to base employment and compensation decisions. In addition, the value-added tests currently in place to measure teacher effectiveness are in many cases inaccurate due to the small sample size involved. In the wake of these findings, I suggest that the formation of an independent body of teacher evaluators would increase the quality of teachers by providing unbiased feedback to the teachers, as well as accurate qualitative information to be used in schools' employment and compensation decisions. These findings are important because they embody a critique of the status quo, as well as a viable alternative to it. By improving teacher evaluations, we improve the quality of teachers, and thereby give Georgia's students the education they deserve.

The Effect of Lipoic Acid on Inflammatory Cytokines and Messenger RNA Levels in Microglial Cells

Lauren Titus

Dr. Nick Filipov, Physiology & Pharmacology, College of Veterinary Medicine

Parkinson's Disease is a crippling neurodegenerative disorder, whose symptoms are caused by dopaminergic cell death in the substantia nigra. The cause(s) of this cell death is still largely unknown, but numerous studies have demonstrated that reactive oxidative species and inflammatory cytokines produced in brain microglial cells damage neighboring dopaminergic neurons, possibly by triggering apoptosis. Microglia could be activated by

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multiple factors, one of them being lipopolysaccharide (LPS), an endotoxin from gram(-) bacteria. When microglia are activated by LPS, they secrete inflammatory cytokines such as TNF- α and IL-6, as well as reactive oxygen and nitrogen species. My research focuses on the anti-oxidant lipoic acid, a non-essential fatty acid able to pass through the blood-brain barrier and its anti-inflammatory effects. Because certain antioxidants also exhibit anti-inflammatory properties, I hypothesized that lipoic acid would neutralize damaging reactive oxygen species, decreasing inflammatory cytokines produced. If neuroinflammation of microglia can be reduced by lipoic acid, then, potentially, the severity of PD could be lessened. To test this hypothesis, I pre-treated microglial cells with varying amounts of lipoic acid and then activated them with LPS. I performed ELISAs and quantitative PCRs to determine how lipoic acid affects the expression and transcription of two inflammatory cytokines, TNF- α and IL-6. The results showed that lipoic acid pre-treatment decreased the expression of TNF- α and IL-6 (24hr) and that this decrease at the protein level correlated with a decrease in mRNA levels of these two cytokines, particularly TNF- α (4hr). This suggests lipoic acid decreases inflammatory cytokine transcription or mRNA stability.

Global Web Advertising: How Different Countries Regulate Digital Advertisement

Emma Torpy

Dr. Leara Rhodes, Grady College of Journalism & Mass Communications

In an increasingly globalized market, corporations and organizations are increasingly utilizing the internet as a platform to build relationships. This process especially manifests itself in online advertising. Since the internet is a worldwide medium—it is the most efficient for a global market. The question is: Do advertisements on the web fall under different laws and jurisdictions in different countries? With so many countries,

and their varied laws, able to access one site—how do we regulate and protect content? Thus far, most guidelines for digital advertising have been based on laws pertaining to print. These laws differ from country to country. For example, while in the United States advertising is regulated by the Federal Trade Commission, the United Kingdom monitors its advertising through “self regulation” (in which the industry itself decides fair practices). Yet, in Singapore, historically the emphasis has been less on protecting the consumer and more on nation-building and monitoring sensitive themes. They do not yet have a legal framework for advertising regulation (Hoy 2008). International corporations need to be aware of the differences between communication laws in countries. In this paper, we will take a brief look at the web advertising laws of the major economic powers in the world—the G8 countries. These countries—Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States—are the most industrialized and thus the most likely to come in contact with each other in trade. Thus it is important for these eight to be familiar with the communication—notably advertising—law of their foreign partners. This paper hypothesizes that, although most of the globe operates by the guidelines of international organizations such as The International Chamber of Commerce or The Committee for Consumer Policy, there are significant differences that we must learn about in order to practice business properly abroad. By looking at these major countries, we can produce guidelines to help corporations plan their online advertising.

Characterization of Cone Degeneration in the Opn1.GFP Transgenic Mouse Retina

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Many eye diseases, particularly those with an underlying genetic cause, have no current

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form of treatment. In order to develop new treatments, good animal models of human disease are required. The Opn1.GFP mouse, which has green fluorescent protein (GFP) expressed in the L/M-cone photoreceptors only, has previously been used in research into *retinitis pigmentosa* (RP) and is the focus of this research project. It has recently been reported that there is a slow decline in GFP-expressing cells, which had been attributed to GFP-mediated toxicity. Preliminary findings suggested that cell death was not limited only to GFP-expressing cells, but was also due to a global cone degeneration, perhaps due to an underlying genetic cause, as a result of insertional mutagenesis of a cone-specific gene during insertion of the Opn1.GFP transgene. To characterise this degeneration, we made retinal sections stained by immunocytochemistry (ICC) which indicated that the degeneration was not limited to L/M-cone photoreceptors but extended to S-cone photoreceptors; this was confirmed statistically by flat-mounted retina cone counts, thus suggesting an underlying genetic cause. To further investigate this, we used various PCR strategies to precisely map the insert location to investigate the effects on neighbouring genes, but they were not successful in locating the insert. This mouse is a new model of a cone-specific degeneration, useful for research into *retinitis pigmentosa*, in addition to being useful for cone survival analyses for early cone degenerations.

Manipulating Tropical Fire Ant Populations to Decrease the Coffee Berry Borer

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The coffee berry borer, *Hypothenemus hampei*, is the greatest pest in coffee production worldwide. Ants are the primary known predators of the coffee berry borer and some research has been conducted into which ant species are the most efficient predators. The tropical fire ant, *Solenopsis geminata*, is common

throughout Central American coffee farms, but *S. geminata* is not known to be a strong predator of the coffee berry borer. We conducted an experiment in two shade farms in Costa Rica to test the hypothesis that *S. geminata* indirectly protects the coffee berry borer by suppressing populations of other ant species. Here we show that removal of *S. geminata* from a coffee plot can lead to a significant increase in the disappearance rate of coffee berry borer beetles from coffee berries on the ground over a 72 hour period compared to control plots.

Optimization of Surface-Initiated Kumada Catalyst Transfer Polycondensation

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Conjugated polymer films are capable of influencing the electrical properties of a surface, and films of these polymers have potential uses in biofuel cells, solar cells and other organic electronic devices. Surface-Initiated Kumada Catalyst Transfer Polycondensation (SI-KCTP) was developed to grow polymer films from surfaces functionalized with a reactive monolayer, a single molecule-thick layer of initiators. Repeated oxidative addition and reductive elimination of a Ni(0)/Ni(II) catalytic group in the presence of monomer initiates a chain growth polymerization from the surface. Each step of this polymerization, however, must be optimized for controllable polymer growth. Cyclic voltammetry was used to analyze the quality of monolayers constructed on indium tin oxide (ITO). These tests determined that the number of holes in monolayer coverage is substantially reduced by the addition of an annealing step to promote coupling after initial deposition. Also, cyclic voltammetry can quantify the Ni(II) groups present on the surface through the addition of a ferrocene based capping agent. Time-dependent studies into deposition conditions indicate that Ni(II)

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reaches a maximum coverage density on a functionalized surface after only a few minutes in solution. These optimization steps have assisted in the consistent growth of conjugated polymer films via SI-KCTP, and further investigation may allow for additional control in the polymer growth.

An Investigation of the Role of Work Status in Relation to Company Growth

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Morgan Capps

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The predictors of positive employee attitudes and work behaviors have long been of interest to industrial/organizational psychologists. Social exchange theory (Blau, 1964) and more recently psychological contract theory (Rousseau, 1998) suggest that employees feel obligated to reciprocate when they receive social or transactional benefits from their organizations. This research examines two aspects of satisfaction with the workplace, compensation satisfaction and communication satisfaction, which lie at either end of the psychological contract continuum, representing transactional and relational benefits respectively (Rousseau, 2001). The primary hypothesis of this study is that, when employees are satisfied with levels of compensation and communication within the organization, this obligation will impact employee's attitudes toward behaviors that grow the company. We investigate the role of work status (full-time or part-time employment) as a potential moderator of this relationship. Existing research informing the direction of the moderation is inconclusive, such that we will develop and test three alternative models. The first model suggests that full-time employees will feel a stronger obligation for growth than part time. The second model suggests that part-time employees will feel a stronger obligation for growth than full-time, while the third suggest that obligations to reciprocate will not differ

between part-time and full-time employees. This study utilizes survey data collected at a large U.S. based shipping and packing company. The results from this study will enrich current understanding of the psychological contracts and extra role performance in the workplace.

Analyzing the Kinetic and Thermodynamic Properties of O-Man Initiated Glycan Binding Alpha-Dystroglycan and Laminin-2

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Alpha-dystroglycan is a heavily glycosylated cell-surface protein that functions as a transmembrane linkage from the cytoskeleton to the extracellular matrix. The defective binding of alpha-dystroglycan to laminin-2 is one cause of congenital muscular dystrophy. A phosphorylated o-mannose glycan on alpha-dystroglycan is required for this binding to occur. Defects in the post-phosphoryl modification of the protein, which is mediated by multiple established and yet unknown glycosyltransferases, are what lead to the defective binding and, by extension, congenital muscular dystrophy. The exact structure of the o-man initiated glycan is not known, but it is hypothesized to have an HNK-1 capped keratan sulfate-like domain. The purpose of this study was to obtain a purified, isolated sample of the FC region of alpha-DG (DGFC4) and run a surface plasmon resonance study to determine the kinetic and thermodynamic parameters binding a DGFC4 chip to laminin, helping determine the structure. The sample was isolated utilizing the transformation of DH5-alpha cells with DGFC4 plasmid, amplification and isolation of the plasmid, transfection of HEK293T and C2C12 cells, purification of the DGFC4 protein from the cells through affinity chromatography, expression of the epitopes, and confirmation

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of purification. The results showed confirmation of DGFC4 expression through the presence of bands in the 95-135 kDa region of SDS-PAGE western blots using IIH6 antibody and wFa treatment. However, analysis using silver stain and coomassie dyes showed a purity of about 80-90%. In order to further purify the protein for use in the SPR study, isoelectric focusing and subsequent ion-exchange chromatography will be used.

Methionine Sulfoxide Reductase Gene Regulation in *Vibrio fischeri*

Michael Webber

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Living cells exposed to reactive oxygen species (ROS) undergo oxidative stress, which damages macromolecules within the cell, including nucleic acids, lipids, and proteins. Cells use various strategies to diminish the harmful effects of ROS including detoxification enzymes, antioxidants, and enzymes that reduce oxidized products. *Methionine sulfoxide reductases (msr's)* are repair enzymes that act on the amino acid methionine (Met) after it has been oxidatively damaged in prokaryotes and eukaryotes. *Msr's* reverse oxidative damage by reducing the oxidized sulfur atom on Met. We are investigating transcriptional regulation of *msr* genes to better understand oxidative stress responses in bacteria and during host-microbe interactions. The bioluminescent marine bacterium *Vibrio fischeri*, which forms a mutualistic relationship with the Hawaiian bobtail squid *Euprymna scolopes*, contains three *msr* proteins encoded by three distinct genes. Transcriptional regulators of these genes were targets in this study. We created a random mutant library of *V. fischeri* using a Transposon. Then, we inserted plasmids with transcriptional fusion between each *msr* promoter and a β -galactosidase gene to identify changes in *msr* promoter activity. Future work will include identifying the site of Transposon insertion to find and

characterize regulators of *msr* genes. The identification of *msr* regulators will allow us to better understand how cells respond to damage caused by oxidative stress.

Cognitive Measures, Antisaccade Performance and Obesity in Children

Abby Weinberger

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Obesity is a rapidly increasing epidemic. Previous studies have found relationships between obesity, fitness and cognition. In children, increased obesity and decreased fitness have been associated with lower performance on tests of aptitude, achievement and executive control (EC). An ongoing study is investigating these relationships in children. Participants are 175 sedentary, overweight (BMI \geq 85th percentile) children, 8 - 11 years old, who are tested at the Georgia Health Sciences University. Participants undergo behavioral and cognitive measures that differentially assess inhibition. The antisaccade task requires inhibition of a glance, and the flanker task requires inhibition of a response to competing stimuli. A correct antisaccade requires inhibition of a reflexive glance towards a peripheral visual cue and generation of an eye movement to its mirror image location. One type of trial assessed in this task is a trial in which the initial glance is an error but is then corrected. This measure and other behavioral inhibition measures can be correlated with well-known measures of cognition, including the Cognitive Assessment System (CAS) and Tower of London (TOL). Preliminary exploratory analyses indicate that children who correct their errors more often and more quickly have higher scores on other cognitive measures. For example, faster reaction times were associated with better performance on the CAS subscales, which have been impacted by chronic exercise in previous intervention studies. Cognitive performance was also related to measures of obesity and fitness. In sum, this study

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provides important information regarding the relationship between effective inhibition and various cognitive measures.

U.S. Policy Alternatives to a Military Takeover in Egypt

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Since the resignation of President Hosni Mubarak, the Supreme Council of the Armed Forces (SCAF) has led the government of the Arab Republic of Egypt. Recent actions by the SCAF have raised concern that the SCAF will not surrender power upon the conclusion of the 2012 election cycle. These conclusions were drawn as a result of the continued use of Emergency Law, the continued use of military trials on civilians and the detainment of international citizens, including citizens of the United States (U.S.). As a result of these observations, the U.S. must anticipate an attempt by the SCAF to hold on to political authority rather than transfer it to the elected officials of the new government. To plan an appropriate reaction to this event, the U.S. should consider previous military controlled governments, including the Republic of Haiti and the Republic of Poland, to chart a response. Effective options the U.S. should consider include enforcing political and economic sanctions, which may range from the reevaluation of military foreign aid, the rescindment of military weapons sales, economic sanctions and continued support for the democratic movement within the Egypt, in an attempt to transfer power from the SCAF to a democratically elected government.

Expression of Secretory Phospholipase A2 in Prostate Cancer Cells Lines.

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Secretory phospholipase A2 (sPLA2) are calcium activated esterases that are secreted to the extracellular side of cells. Recent studies show that sPLA2 expression in prostate cancers correlates to metastasis and poor prognosis. There are several isoforms of sPLA2, which are categorized into groups (e.g. Groups I, II, III, V and X). Few reports have examined the differential expression of sPLA2 in cancer cells. Thus, we used reverse transcriptase-polymerase chain reaction (RT-PCR) and quantitative PCR (qPCR) to study the expression of sPLA2 in prostate cancer cell lines (PC-3, LNCaP and DU-145 cells). Our sPLA2 studies included Groups IB, IIA, V and X. Group IB sPLA2 was expressed in all three cell lines. Group IIA sPLA2 was detected in LNCaP and DU-145 cells, with lower levels detected in PC-3 cells. Group V sPLA2 was detected in LNCaP and PC-3 cells. In contrast, Group X sPLA2 was detected in all cells but was highest in PC-3 cells. RT-PCR does not allow for a quantitative comparison of mRNA levels between cells; therefore, we used qPCR to show that Group IB sPLA2 had higher levels of expression in PC-3 cells compared to LNCaP cells, which had higher levels of expression than DU-145 cells. Group IIA sPLA2 and Group V sPLA2 followed the same pattern of expression in all three cell lines. Group X sPLA2 expression was highest in PC-3 cells, followed by DU-145 cells, with low levels in LNCaP cells. Collectively, these results show the differential expression of sPLA2 isoforms in prostate cancer cells.

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A Sociolinguistic Perspective on Roswell, Georgia

Anna Wilson

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Where once Spanish was relegated to historically Hispanic-influenced parts of the country, it can now be heard in virtually every corner of our nation. Hispanics, or *Latinos* as they prefer to be called, have profoundly impacted the size, look, and feel of our cities. Knowing this, I began working with Dr. William Kretzschmar's *Roswell Voices* project, as well as the Roswell Convention and Visitors Bureau, in Fall 2011, in an attempt to describe the sociolinguistic experience of the Latino community of Roswell, Georgia. In order to achieve this goal, I have tried to elicit community, volunteer-based participation in a series of interviews. Entering into the Latino society of Roswell proved difficult. Thus, as a byproduct of my original research inquiry, I have collected qualitative data about the closed nature of Roswell's Latino community. These observations are pertinent to the fields of Sociolinguistics and Spanish in the United States U.S., as they provide insight into the nature of Latino communities outside the Southwestern and Northeastern U.S., and are important if we are to understand the changes taking place in Georgia's culture and for Latinos in the Southeastern U.S.

The Effect of Hypoxia on Transketolase in Breast Cancer Cells

Star Ye, CURO Summer Fellow

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Due to the hypoxic microenvironment of solid tumors, breast cancer cells preferentially rely on anaerobic glycolysis for ATP generation. Paralleling the rapid growth of tumor cells, an increase in glucose uptake is one of the most recognizable phenotypic changes in cancer. Glucose is required for glycolysis and is subsequently metabolized to

glucose-6-phosphate prior to entering the pentose phosphate pathway (PPP). The principal function of the PPP is to generate ribose-5-phosphate for nucleic acid synthesis and NADPH for reductive biosynthetic reactions. Within the nonoxidative branch of the PPP, the thiamine-dependent enzyme transketolase (TKT) is rate-limiting. TKT catalyzes a reaction that produces glyceraldehyde-3-phosphate and fructose-6-phosphate, which can be shunted into the glycolytic pathway. Essential for TKT activity is the enzyme cofactor thiamine pyrophosphate (TPP), produced by the conversion of thiamine by thiamine pyrophosphokinase 1 (TPK1). Our research has shown that hypoxia induces increased glucose consumption, thiamine uptake and TPK1 expression in breast cancer cells. We hypothesize that TKT activity increases with increasing expression of TPK1 in hypoxia. Preliminary results from transketolase assays show an increase in transketolase activity in hypoxic breast cancer cells. Also, RT-PCR and western blotting reveal that hypoxia does not change TKT mRNA and protein expression, suggesting that increased TKT activity may be a result of increased TPP availability. This study demonstrates the implications of thiamine in breast cancer, indicating that TPP may be a key enzyme cofactor in anaerobic cancer metabolism.

Addressing Students' Math Deficiencies in Introductory Physics with Online Scaffolded Problems

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Introductory physics courses are mathematically demanding, even those for non-physics science majors. Students must become adept at solving a wide variety of quantitative problems. However, even students with calculus experience often lack facility with basic pre-calculus skills. A large

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contributing factor to the problem is the students' generally poor retention of working math skills, but they also struggle to transfer their math knowledge to unfamiliar problem domains. These students should benefit from early intervention that continues to scaffold throughout the term. We report on our efforts to create and evaluate math-related, online formative assessment modules for first semester introductory physics. These online tutorials target specific mathematical skills that are essential to success in physics, and are designed to progress from a purely math-centered review of each basic skill, to problems of increasing generality and complexity, and ultimately toward a transfer of these skills to physics problem domains.

Reversal of Acepromazine Sedation by Doxapram in Dogs

Mark Zapata

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Acepromazine generally produces long-lasting, mild to moderate sedation and depresses the central nervous system. Doxapram works as a non-selective central nervous system stimulant that directly works at the respiratory center in the brain stem. The purpose of this study was to evaluate the effectiveness of two doses of doxapram to reverse acepromazine sedation in dogs. Dogs were randomly assigned to one of three treatment groups. Each group was administered acepromazine followed 30 minutes later by saline solution with 1.25mg/kg doxapram or 2.50mg/kg doxapram. Sedation scores were obtained at 0, 15 and 30 minutes after acepromazine administration and at 5, 15 and 30 minutes after treatment administration. Comparison of sedation scores for all time points and groups revealed a significant correlation between use of doxapram and decreased sedation scores. Dogs were noticeably more alert and interactive after doxapram treatment. There was not a significant difference between the

effects of the 1.25mg/kg dose and 2.50mg/kg doses of doxapram. This study determined doxapram to be effective in reversing the behavioral effects of acepromazine for a short period of time. We recommend a 1.25mg/kg dosage of doxapram to reverse the effects of acepromazine sedation in dogs.

Photoimmunotherapeutic Nanoparticles for Combination Therapy of Breast Cancer

Dhillon Zaver

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Cancer is among the leading health problems in society today. Though there are several methods of treatment, the combination of photodynamic therapy, using light to activate a complex in a specific area, and immunotherapy, the activation of the host's immune system to fight the cancer, has largely remained unexplored. Thus, the effective formation of a nanoparticle based complex for the wide delivery of drug and activation of specific immune response to combat this issue is an ideal place to explore. To this end, a nanoparticle platform that has a photosensitizer to destroy localized cancer in the visible light and a dissociating dendritic cell activator to initiate an immune response against the cancer, as well as possible cancer metastasis, can be imagined. Construction of such a platform, using chemical, biological, and nanotechnology based tools and its characterization will be presented. Preliminary in vitro studies will be used to verify the potential of such a platform for cancer therapy. If this platform can be proved effective, a new alternative therapeutic option for metastatic cancer can be envisioned.

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