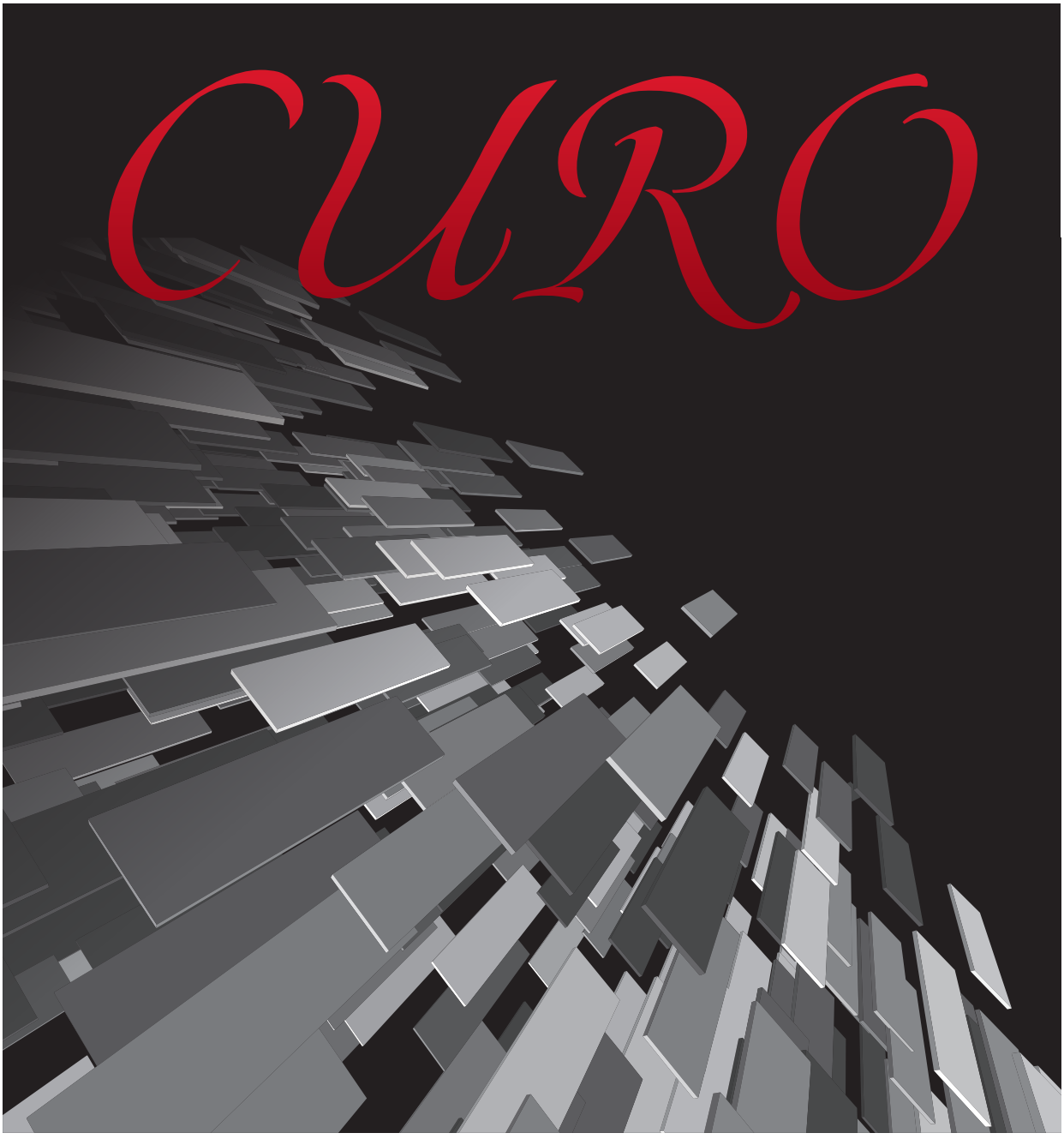
THE UNIVERSITY OF GEORGIA

CENTER FOR UNDERGRADUATE RESEARCH OPPORTUNITIES



PROGRAM & ABSTRACTS

2013 CURO SYMPOSIUM

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THE UNIVERSITY OF GEORGIA
CENTER FOR UNDERGRADUATE RESEARCH OPPORTUNITIES

2013

CURO

Symposium

Program and Abstracts

CURO Office
203 Moore College
The University of Georgia
Athens, GA 30602
(706) 542-5871

http://www.curo.uga.edu

Symposium chair:	Dr. Martin P. Rogers, Associate Director of CURO and the Honors Program
Book of abstracts:	Matthew Jordan, Program Coordinator, Center for Undergraduate Research Opportunities
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CURO

April 1, 2013

Dear Students, Faculty, and Guests:

Welcome to the 13th annual CURO Symposium, UGA's celebration of undergraduate research across the disciplines. Many individuals—administrators, faculty members, staff, graduate students, and, of course, undergraduates—have collaborated to make the CURO Symposium the premier undergraduate academic event at UGA.

Each year, the Symposium has grown larger, and the 2013 Symposium is the largest to date, with 211 undergraduate researchers communicating their substantial accomplishments to their peers, mentors, and the public at large.

From its inception, the CURO Symposium has showcased research and scholarship in all disciplines. The 2013 Symposium continues that commitment, featuring presenters from 51 departments in 13 colleges/schools. Thus, today evidences UGA's broad and substantial support of research, and the invaluable commitment of UGA's administration and faculty to mentoring and providing exceptional learning opportunities for our undergraduates.

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

Sincerely,

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

Dr. Martin P. Rogers, '01, '11
Associate Director

Acknowledgements

Special Assistance for 2013 CURO Symposium

Ms. Erin Kattos	Student Worker, CURO
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors Program
Ms. Amanda Pruitt	Assistant to the Director, Honors Program
Ms. Chelsea Smith	Administrative Associate, External Affairs, Honors Program
Ms. Jessica Thompson	Student Worker, CURO
Ms. Eleana Whyte	Administrative Associate, CURO

Technology Equipment and Support for 2013 CURO Symposium

Center for Teaching & Learning
College of Agricultural & Environmental Sciences
College of Education
College of Family & Consumer Sciences
Franklin College of Arts & Sciences
Honors Program
Terry College of Business

Reviewers for 2013 CURO Research Mentoring Awards

Dr. David S. Williams	Associate Provost and Director of Honors and CURO
Dr. Martin Rogers	Associate Director of Honors and CURO

Reviewers for 2013 CURO Summer Research Fellowships

Dr. Brian Cummings	Department of Pharmaceutical and Biomedical Sciences
Dr. Monica Gaughan	Department of Health Policy & Management
Dr. Timothy Hoover	Department of Microbiology
Dr. Patricia Hunt-Hurst	Department of Textiles, Merchandising, & Interiors
Dr. William Kisaalita	College of Engineering
Dr. Martin Rogers	Associate Director of Honors and CURO

Reviewers for 2013 CURO Symposium Best Paper Awards

Dr. Carl Bergmann	Department of Biochemistry & Molecular Biology
Dr. Pamela Orpinas	Department of Health Promotion & Behavior
Dr. Martin Rogers	Associate Director of Honors and CURO
Dr. Brock Tessman	Department of International Affairs

Oral Session Conveners for 2013 CURO Symposium

Ms. Lisa Bolding	Department of English
Mr. Sean Buskirk	Department of Infectious Diseases
Ms. Lindsay Coco	Honors Program
Mr. Douglas Eudy	Institute of Plant Breeding, Genetics & Genomics
Ms. Michelle Johnson	Academic Advisor, Honors Program
Ms. Teneema Kuriakose	Department of Infectious Diseases
Mr. Bill McDowell	Odum School of Ecology
Ms. Emily Myers	Administrative Associate, Foundation Fellowship Office, Honors Program
Ms. Jessica Reichard	Honors Program

Acknowledgements

Mr. Greg Roundtree	Administrative Associate, Office of Recruitment, Honors Program
Ms. Elizabeth Sassler	Honors Program
Mr. Alexander Vaughn	Department of Chemistry

Schedule

Monday, April 1, 2013

Oral Session I **9:05-9:55 a.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session II **10:10-11:00 a.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session III **11:15-12:05 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I

Oral Session IV **12:20-1:10 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session V **1:25-2:15 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session VI **2:30-3:20 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Awards and Keynote Session **4:00-5:00 p.m.**
Grand Hall Atrium (downstairs-use escalator in lobby)

Poster Session and Reception **5:00-6:00 p.m.**
Grand Hall South (downstairs-use escalator in lobby)

The 2013 CURO Symposium will conclude at 6:00 p.m.

CURO Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the CURO Research Mentoring Awards, formerly the EURM awards, in 2001.

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

2013

Master Level Faculty Award

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

Early Career Faculty Award

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

2012

Master Level Faculty Award

Dr. Lawrence Shimkets, Department of Microbiology, Franklin College of Arts & Sciences

Early Career Faculty Award

Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

2011

Master Level Faculty Award

Dr. Eric Stabb, Department of Microbiology

Early Career Faculty Award

Dr. John Drake, Odum School of Ecology

Program Award

Savannah River Ecology Laboratory
Dr. Kenneth McLeod, Interim Director

2010

Early Career Faculty Award

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

2009

Early Career Faculty Award

Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Department of Microbiology
Dr. Dawn T. Robinson, Department of Sociology

2008

Master Level Faculty Award

Dr. John J. Maurer, College of Veterinary Medicine

CURO Research Mentoring Awards

Early Career Faculty Award
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology

Program Award
Biomedical and Health Sciences Institute
Dr. Harry S. Dailey, Director

2007

Master Level Faculty Award
Dr. Timothy Hoover, Department of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Department of Animal & Dairy Science

2006

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Department of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Department of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD candidate in Plant Biology

2005

Faculty Award
Dr. Gary Barrett, Odum School of Ecology
Dr. Sidney Kushner, Department of Genetics
Department Award
Department of Cellular Biology

2004

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

2003

Faculty Award
Dr. Jody Clay-Warner, Department of Sociology
Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator
Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Department of Plant Biology
Dr. Marie-Michèle Cordonnier-Pratt, Department of Plant Biology

CURO Research Mentoring Awards

2002

Faculty Award

Professor William D. Paul, Jr., Lamar Dodd School of Art
Dr. Katherine Kipp, Department of Psychology

Faculty Recognition

Dr. Susan Sanchez, College of Veterinary Medicine

Department Award

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

Program Award

"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Department of Physics & Astronomy
Dr. Heinz-Bernd Schuttler, Department Head, Department of Physics & Astronomy
Dr. Jonathan Arnold, Department of Genetics
Dr. Susmita Datta, Georgia State University
Dr. David Logan, Clark Atlanta University
Dr. William Steffans, Clark Atlanta University

2001

Faculty Award

Dr. Marcus Fechheimer, Department of Cellular Biology

Faculty Recognition

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

Department Award

Department of Genetics
Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

CURO Symposium Best Paper Awards

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

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

Each recipient is recognized at the Symposium's Award and Keynote Session, and each award carries $100 in financial support, generously provided by the UGA Alumni Association. Winners from the 2013 CURO Symposium are listed below.

Arts:

Brendan Boyle	The "Darlton" Initiative: Serial Complexity, Parallel Media Narratives and Showrunner Tactics in *LOST*

Biological Sciences:

Lauren Titus	The Anti-Inflammatory Effects of Lipoic Acid on Inflammatory Cytokines

Civic Responsibility Focus:

Dalton Mark	The First Rule of Camorra Is You Do Not Talk about Camorra: An Investigation into the Rise of the Organized Crime Syndicate in Naples, Italy

Humanities:

William Prigge	"Is Black So Base a Hue?" An Examination of Aaron and Racial Dynamics in *Titus Andronicus*

International Focus:

Patrick Wheat	Justice for All: The Vitality of Addressing Judicial Structures During Reconstruction Period

Physical Sciences:

Miriam Perryman	Embodied Energy Requirements for Meat Calorie versus Non-meat Calorie Production: A Comparative Study of Nine Countries

Social Sciences:

Meghan Foley, Katryna McCann	Managers vs. Employees: The Differing Effects of Communication Strength and Supervisor Support on Work Engagement

Program

Monday, April 1, 2013

Concurrent Oral Session I: 9:05 – 9:55 a.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Emily Vermillion**	An Analysis of the Effect of Phytase Phosphorous Absorption and Growth in Nursery Pigs
	Brigid Burns	Anesthetic Complications in Dogs Undergoing Surgery for Liver Disease
	Steven Mathew	The Use of Scheduled Combination Treatments of Etoposide and Doxorubicin to Treat Feline Injection Site Sarcoma Cells
Room B	**John-Jordan Nunnery**	Removing Barriers to Vision Services for School Children
	Terese Gagnon	On Memory's Tidewater: Sapleo Island Documentary Project
	Christine Bassett	Popular and Folk Medicine: Towards an Understanding of the Latino Health Paradox
Room C	**Maria Cox**	When is a Kiss a Thimble? Sexuality in Adaptations of *Peter Pan* over Time
	Jared Stepp	Sitcom Technology through the Ages
	Brendan Boyle	The "Darlton" Initiative: Serial Complexity, Parallel Media Narratives and Showrunner Tactics in *LOST*
Room D	**Nicholas Ramos-Franklin**	Democratic Peace Theory: An Accurate View or Team Alliance
	Conner Blackwell	The Aversion to Condom Use in an HIV-saturated World
	Kameel Mir	Civil Society Collaboration between the U.S., E.U., and Turkey
Room G	**Kelly Tucker**	The Role of Cognitive Tasks in the Conceptualization and Assessment of ADHD
	Hania Bisat	Election Triggers: How a Sip of Water Can Ruin a Campaign

	Brett McCardel	Performance on a Saccade Task under Varying Cognitive Load
Room H	**Callan Brownfield, Robert Ashley**	Synthetic and Enzymatic Decarboxylation of Tyrosine Derivatives
	Elena James	Targeting the *Mycobacterium smegmatis* cobU Gene to Study Vitamin B12 Biosynthesis
	Lauren Titus	The Anti-inflammatory Effects of Lipoic Acid on Inflammatory Cytokines
Room I	**Dalton Mark**	From Feudalism to Democracy: Using Political Philosophy to Reframe Traditional Distinctions between the Great Ages of Europe
	Dalton Mark	The First Rule of Camorra is You Do Not Talk about Camorra: An Investigation into the Rise of the Organized Crime Syndicate in Naples, Italy
	Kangkyu Lee	Rekindling the Hermit Kingdom
Room J	**Brittany Truitt**	Determining a Method for Pharmacologic Rescue of Mutations that Affect Tissue-specific Glycan Expression in *Drosophila melanogaster*
	Mathew Joseph	Autophagic Responses in the Murine Model of Placental Malaria
	Nicholas Richwagen	Algae Biomass Production Using Compost Leachate Water and Evaluation of Biomass Harvesting Techniques

Concurrent Oral Session II: 10:10 – 11:00 a.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Michelle Norris**	*Dormant*: A Photographic Series
	Samuel Smith	Multiple Marlows: Intertextuality and Irony in Conrad's Marlow Tales
	Jacqueline Van De Velde	A Critical Examination of Anglicanism in the Life of Laurence Sterne and Its Implications within *Tristram Shandy*

Room B	**Chelsea Sexton**	*Pseudo-nitzschia* in the Diet of *Paraprionospio pinnata*, a Polychaete in the Gulf of Mexico Hypoxic Zone: Potential Mechanism for Toxin Bioaccumulation
	Na Hyung Choi	The Origin of Unusual Phosphate Deposits on the Venezuelan Island of Gran Roque, Leeward Antilles
	Ian Karra	Developing a Sustainability Policy for the University System of Georgia
Room C	**Peter Melampy**	Components of Economic Freedom and the Institutional Approach to Economic Growth
	Colin Dungu	Analyzing Linkages between Economic Development Models and Food Security: Comparative Case Study of Thailand, Vietnam, and the Philippines
Room D	**Katherine Arnold**	Music, Metaphorical Language, and Expanding Thought Networks in Shelley's "To a Skylark"
	Fiona Sheehan	The Unpublished Letters of Elizabeth Bishop
	Daniel LoPilato	Mapping Narrative: The Structure and Composition of a Short Story Cycle
Room G	**Ashton Garner**	Compensatory Exercise and Thinness Expectancies
	Jake Moskowitz	Occupational Complexity as a Predictor of Cognitive Reserve
	David Parker	Understanding the "Gap" Effect in the Generation of Express Saccades
Room H	**Patrick Wheat**	Justice for All: The Vitality of Addressing Judicial Structures during Reconstruction Period
	Terese Gagnon	Landscapes of the Interior: Ethnobotany and Sense of Place among Karen Refugees
	Aveek Sarker	Chinese Foreign Direct Investment in the United States: A New Game

Concurrent Oral Session III: 11:15 – 12:05 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I

Room A	**Hannah Klevesahl**	Fanny Kemble: A Juliet of a Different Era

	Gloria Kim	The Birth of Metrosexuality in South Korea
	Margaret Touchton	The Women of *Richard III* Revisited
Room B	**Elijah Staggers**	The Black Youth Vote in the 2012 Presidential Election: Disillusioned or Reenergized?
	Madison Lamar	Grandparenting from the Dump
	Emily Peng	Increasing Access to Specialty Services in Community Health Centers: Policy Alternatives and Implications for Minority Communities
Room C	**McKinley Alden**	German Inalienable Possession Constructions
	Minh Ngoc Nguyen	Vietnamese Language Attitudes, Use, and Identity: Determining a "Fobby" Vowel Quality
Room D	**Melinda Johnson**	Drug and Mental Health Courts in Georgia's Criminal Justice System
	Aditya Aphale	The Relationship between Dynamic Postural Stability Index Composite Scores and Talar Tilt Average Scores
	Carol Conroy	Exploring the Use of Comprehensive Nutrition Education Programs as a Means of Reducing Food Insecurity in Georgia
Room G	**Todd Pierson**	Traditional and Environmental DNA Detection of a Rare Amphibian
	Ridwan Mahbub	Development of a PCR-based Marker to Identify Overwintering Sites for *Exobasidium* sp. on Blueberries in Georgia
	Cameron Prybol	Discover Life Mothing Project
Room H	**Krista Ritchie**	Identifying Possible Roles for Structural Proteins in Thymus Morphogenesis
	Travis Williams, Jr.	Comparison of Two Biocatalysts for Ethanol Production from Pectin-rich Biomass with Varying Levels of Industrial Processing
Room I	**Rebekah Myrick**	Three Dimensional Cell Based Assay Standard for Pharmaceutical Testing

	Natalie Levey	Pharmacological Manipulation of the Neuromuscular Junction between Stem Cell Derived C2C12 Muscle Cells and Motor Neurons

Concurrent Oral Session IV: 12:20 – 1:10 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Ashley Thompson**	There's Another Side to the Story: Examining the Blacklist Resulting in the HUAC Hearings of the 1950s
	William Murdock, Jr.	Story-gathering and Community Performance
	Emily Hoskins, Dakota Nesbitt	Converting Culture: Relating 19th Century Women's Dress to a 1960s Society
Room B	**Matt Burns**	Where a Kid Can Be a Kid, Even When She's an Adult – The Internet's Role in Sustaining Engagement with Children's Television
	Adam Samples	The Epistle of James: Discovering Its Conception of Faith and Works and Its Call for Social Justice
	Charles Hicks	How the White Protestant Church Should Respond to Issues Affecting Lesbian, Gay, Bisexual, and Transgender People
Room C	**William Austin II**	Groundwater in Sub-Saharan Africa
	Amelia Watson	Navigating Sickle Cell Disease in Africa
Room D	**Dervin Cunningham**	Proteomic Analysis of the Tomato/*Botrytis cineria* Interaction
	Alexandra Auger	Evaluation of Live Virally-vectored Vaccine for Malaria in Murine Model
	Savannah Pena	Lipid Association Improves Hemoglobin-binding Capacity by Haptoglobin Related Protein
Room H	**Savannah Colbert**	Democratic Dialogue: Comparing Presidential Debate Content and User-generated Comments in Online News
	Mackenzie McRae	Policy Analysis: US-Afghanistan Reconstruction Efforts
	Kirstie Hostetter	Affordable Housing in a Poverty-stricken Community

Room I	**Emily Stubbs**	For the Love of God: Damien Hirst and a Room with a Corpse
	Joanna Caffrey	The Excommunication of Early Jewish Christians and Its Interpretive Value for the So-called Temple Cleansing in the Gospel of John
	Lindsay Ullrich	Major Clarity in a Minor Paradox: The Role of Mark 9:24 in Illuminating the Markan Conception of Faith in the Context of Discipleship
Room J	**Katherine Hsieh**	Relationship between Approximate Entropy and Dynamic Postural Stability in Ankle Instability
	Phillip Ogea	Classification of Protein-ligand Interactions of *P-glycoprotein*

Concurrent Oral Session V: 1:25 – 2:15 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Richard Gardiner**	The Death of the Death Penalty
	Travis Miller	Trade-offs: The Effects of Contiguous Rivalries on International Decision-making
	Jinny Park	Leading from Behind: A Progressive Outlook on U.S.-North Korean Relations
Room B	**Alexandra Prather**	The Few. The Proud. The Marines.
	Jeanette Kazmierczak	Pervasiveness of Science News in First-world Countries vs. in Emerging Economic Powerhouses
	Olivia Gorbatkin	Science Lecture Classrooms: Extending the Bounds of Creative Teaching and Learning
Room C	**Carley Borrelli**	Examination of Age as a Moderator of the Relationship between Sleep Quality and Job Satisfaction
	Sarah Evans	Comparison of an Embedded Effort Measure on CNS Vital Signs between Older and Younger Adults
	Rachel Callery	Vocal Intonation as a Social Referencing Cue in Infants and African Grey Parrots

Program

Room D	**Theresa Stratmann**	Developing Methods to Locate and Survey for Rare Species: a Case Study Using the Endangered Bog Turtle (*Glyptemys muhlenbergii*)
	Brent Zurcher	Understanding Ecological Networks: A Mathematical Approach to Ecosystem Balancing and Analysis
	Victoria Staples	Body Size and Temperature: A Report on Moth Activity in Clarke County
Room G	**Zachary Holmes**	Top-down Control by Bonnethead Sharks in Oyster Reef Communities through Consumptive and Non-consumptive Effects
	Kelly Murray	Investigating the Indirect Effects of Guppy Introduction on Populations of a Shredding Caddisfly in Trinidadian Streams
	Megan Sheehan	Effects of the Amazon River Plume on Subsurface Waters: Measuring the Effectiveness of the Plume's Uptake of Atmospheric CO_2
Room H	**Grant Moody**	Conformational Preferences of a Prototype Biomolecule in Liquid Helium Nanodroplets
	Kasey Darley	A Therapeutic Nanoparticle Platform for Ischemic Brain Injury
	Richard Weimar III	Where Chemistry Meets the Classics: First-ever Modern Scientific Analysis of Pompeiian Polychrome Sculptures
Room I	**Eilidh Geddes**	Teacher Cheating Scandals in Georgia and Possible Policy Solutions
	Jesse Chan	Increasing Georgian Household Participation in the Banking System
	Mugdha Joshi, Alex Edquist	Academic Steroids: The Need to Control Adderall Abuse on University Campuses
Room J	**Stephanie Wilding**	Investigation of the Mechanism of Bile Acid-induced Prostate Cancer Cell Death
	Courtni Young	Relationship between Number of Years in Animal Health Practice and Recognizing Pain

	Torre Lavelle	Transforming Animal Shelters into a Service-based Economy

Concurrent Oral Session VI: 2:30 – 3:20 p.m.
Athena Breakout Rooms A, B, C, D, E, G, H, I, J

Room A	**Samantha Frigerio, Elijah White**	Water Loss Tates of Two Terrestrial Salamanders, *Plethodon shermani* and *Plethodon teyahalee*, and Their Hybrids
	Scott Saunders	The Future of Lyme Disease: Virulence Determined by Climate
	Joyce Huang	The Prevalence of Salmonella Infection in Various Southeastern Wild Aquatic Turtles and Captive Painted Turtles (*Chrysemys picta*)
Room B	**Philip Grayeski**	Cell Cycle Gating of the Mammalian Sonic Hedgehog Signaling Pathway
	Alyse Ragauskas	Extending Genetic Methods to Members of the Genus *Caldicellulosiruptor*: Use for Metabolic Engineering Biofuel Production from Biomass
	Jennifer Pallansch	Characterization of the Light Signaling System in Fireflies
Room C	**Tuan Nguyen**	Structural Evolution of the Ca_2^+/Calmodulin Dependent Protein Kinase
	Cole Skinner	Characterization of an RNA-protein Immune Complex Functioning in Prokaryotic Viral Defense
	Michelle Mackenzie	Cope's Gray Treefrog's Preference to Occupy Different Colors of Artificial Refugia
Room D	**Hope Foskey**	Identification of GABA-responsive Neurons in the Zebrafish Brain
	Conner Blackwell	Striated Fiber Assemblin in Tetrahymena
	Stephen Bocarro	The Overexpression of Long Flagella Protein 4 in *Tetrahymena thermophila*
Room E	**Allison Gantz**	"Pretty What?"— An Exploration of Society and Gender through Movement

Program

Room G	**William Willoughby IV**	The Role of Technology in Early North American Pacific Colonialism
	Christina Azahar	Perspectives on Postnationalism in Chilean *nueva canción*
	Rachel Pérez	The Fever for Progress: Yellow Fever in 19th and 20th Century Havana and Savannah
Room H	**Alisa Zezetko**	Mikhail Bulgakov's Mysteries: The Personas, Metaphors, and Names of the Novel *The Master and Margarita* Analyzed in a Historical Context
	Anna Wilson	Stories of Roswell, Georgia: A Sociolinguistic Study of Narrative Structure
	Jacqueline Van De Velde	Crossing the Threshold: British Integration Policy through Haifa Zangana's *Women on a Journey Between Baghdad and London*
Room I	**William Prigge**	Is Black So Base a Hue? An Examination of Aaron and Racial Dynamics in *Titus Andronicus*
	Brittany McGrue	The Need for Universal Design: An Environmental Assessment of Residential Interior Spaces and the Built Environment
	Amy Moulton	Stepping into Masculinity: The Dress and Body Modification of African American Fraternities
Room J	**Lily Kim**	What Differentiates Certain Salmonella Serovars from Others in Their Ability to Cause Human Illnesses?
	Julia McElreath	Development of Avian Infectious Bronchitis Virus-like Particles
	Smitha Ganeshan	Access Care

4:00 p.m. Awards and Keynote Session
Grand Hall Atrium (downstairs - use the escalator in the lobby)

Welcome and Introductions	Dr. David S. Williams, Associate Provost and Director, Honors Program
Remarks	Professor Jere W. Morehead, Senior Vice President for Academic Affairs and Provost

Program

Introduction to Awards	Dr. Martin Rogers, Associate Director of CURO & Honors
CURO Research Mentoring Awards	Dr. David C. Lee, Vice President for Research
2013 Symposium Best Paper Awards	Dr. Laura Jolly, Vice President for Instruction Ms. Deborah Dietzler, Executive Director, Alumni Association
UGA Libraries' Research Awards	Ms. Caroline Barratt, Director, Miller Learning Center Library Commons
Introduction of Keynote Speaker	Ms. Maria Cox, Foundation Fellow '14, English
Keynote Address	Dr. Fran Teague, Meigs and University Professor of Theatre and English "The Lavish Elegance of Research"
Closing Comments	Dr. David S. Williams, Associate Provost and Director, Honors Program

5:00 p.m. Poster Presentations
Grand Hall South (downstairs - use the escalator in the lobby)

Poster #1	**Tiffany Cauthen**	Classifying the Legitimacy of Malicious Domains for Safer Internet Browsing
Poster #2	**Elliot Outland**	Finite-difference Time-domain Investigations of Metamaterials
Poster # 3	**Samuel Kennedy**	Mitochondria Targeted Delivery of Cisplatin Prodrugs
Poster # 4	**John Harper**	Anoxic Transition within the Smoky Hill Chalk Member of the Niobrara Formation and its Effect on Organic and Inorganic C-N Assemblages
Poster # 5	**Abigail Maxwell**	Comparison of Crustal Chemical Composition of the Carolina Terrane and Inner Piedmont using Vp/Vs Ratios Obtained from Broadband Seismic Data
Poster # 6	**Abigail Saenger**	Melt Inclusion Study of the East Fork Rhyolite Member of the Valles Caldera, New Mexico
Poster # 7	**Samantha Frigerio**, **Elijah White**	Water loss Rates of Two Terrestrial Salamanders, *Plethodon shermani* and *Plethodon teyahalee*, and Their Hybrids

Poster # 8	**Matthew Knull**	Trout Angler Awareness of the Hemlock Wooly Adelgid and Its Effect on Trout Habitat and the Available Treatment Methods
Poster #9	**Lara Mengak**	"Why Is There an Alligator in My Pool?" Assessing Potential Range Shifts with Sea Level Rise
Poster # 10	**Megan Sheehan**	Effects of the Amazon River Plume on Subsurface Waters: Measuring the Effectiveness of the Plume's Uptake of Atmospheric CO_2
Poster # 11	**Heather Abernathy**	A Disease Ecology Project Without the Disease: A Survey of Trichnonomiasis in House Finches in Athens, GA
Poster # 12	**Melanie Fratto**	A Testosterone Tale: Do Females Really Have Higher Levels than Males?
Poster # 13	**Zachary Holmes**	Top-down Control by Bonnethead Sharks in Oyster Reef Communities through Consumptive and Non-consumptive Effects
Poster # 14	**Chelsea Sexton**	Pseudo-nitzschia in the Diet of *Paraprionospio pinnata*, a Polychaete in the Gulf of Mexico Hypoxic Zone: Potential Mechanism for Toxin Bioaccumulation
Poster # 15	**Delaney Kolich**	A Comparison of the Effectiveness of Plant DNA Extraction Methods against Two Common Secondary Metabolites
Poster # 16	**J. Taylor Bellamy**	Effect of Muscadine and Concord Grape Juice Phenolics on the Oxidation of LDL
Poster # 17	**Hannah Harrison**	Epigenetic Pathways and Glutamate Transporters in Neuropathic Pain
Poster # 18	**Katie Tuggle**	Differential Expression of RGS Proteins during Neural Differentiation
Poster # 19	**Stephanie Wilding**	Investigation of the Mechanism of Bile Acid-induced Prostate Cancer Cell Death
Poster # 20	**Star Ye**	The Effect of Thiamine Supplementation on Transketolase Activity in Cancer Cells
Poster # 21	**Kevin Cown**	Second Law of Thermodynamics Efficiency Analyses of High-voltage Electricity Transmission

Poster # 22	**Rebekah Myrick**	Three Dimensional Cell Based Assay Standard for Pharmaceutical Testing
Poster # 23	**Miriam Perryman**	Embodied Energy Requirements for Meat Calorie Versus Non-meat Calorie Production: A Comparative Study of Nine Countries
Poster # 24	**Dillon Davis**	Topology of the Ras Converting Enzyme
Poster # 25	**Elizabeth Guarisco**	Examination of the Link between Glycosaminoglycans and Pectins
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Abstracts

A Disease Ecology Project without the Disease: A Survey of Trichomoniasis in House Finches in Athens, GA

Heather Abernathy
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Trichomoniasis is an infection caused by the protozoan *Trichomonas gallinae* and is known around the world to cause morbidity and mortality in columbiform species and birds of prey (Bondurant and Honigberg 1994). It is now believed that the infection is spreading in North America and primarily affects members of the finch family (Fringillidae). In this study we captured and sampled house finches for the presence of *Trichomonas gallinae* in the Athens, GA area. We used two methods to detect the parasite: wet-mounts and commercial kits designed to culture Trichomonid parasites. We sampled a total of 34 house finches, and of these, 9 birds had visible signs of mycoplasmal conjunctivitis. We did not detect *T. gallinae* in any of the birds, which indicates it is not present in this area, or that birds with the disease are removed from the mobile population.

German Inalienable Possession Constructions

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In German, possessive constructions with inalienable prepositional phrase-embedded objects yield either an accusative- or dative-marked possessor. The construction in question is defined by the seemingly random interchangeability of the accusative and dative case, for example, "Der Junge hat ihn/ihm in die Nase gebissen" ("The boy has him-*Acc/Dat* in the nose bitten" or, less literally, "The boy bit him in the nose"). Previous studies suggest that degree of affectedness was the direct cause of this apparent equivalence of case— namely, that a more heavily affected object will be taken in the accusative case (Draye 1996, Lamiroy and Delbecque 1998). However, a lack of reliable objective quantification of affectedness and the inability of this theory to explain examples when parts of speech not directly present in the construction change degree of affectedness— for example, adjectives "increasing" affectedness do not change case marking— show that this established idea cannot be true. Here we take the position that the ability to use either case is dependent on the presence of verb-specified directed motion, the endpoint being a goal prepositional phrase. A combination of corpus search, interview, and survey will be used on subjects who were either born, raised, or currently reside in Germany, or speak the language as their mother tongue. This methodology should yield results that will, when superimposed on preordained German case laws, generate valuable syntactic information and aid in the further construction of German grammar.

The Relationship between Dynamic Postural Stability Index Composite Scores and Talar Tilt Average Scores

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In the United States, about 25,000 lateral ankle sprains occur per day, with 74% of those afflicted developing chronic ankle instability (CAI). Increased mechanical laxity, or looseness, of the ankle ligaments may influence the development of CAI, as can deficits in postural stability. These two constructs may interact to increase severity of CAI. The purpose of this study was to determine whether there was a correlation between Dynamic Postural Stability Index (DPSI) composite scores and talar tilt scores. Seventy-eight recreationally active college-aged participants completed a forward hop onto a single leg and balanced on a force plate. Participants also had talar tilt measured using the instrumented LigMaster device, which applies a known inversion force to the

ankle and calculates resultant tilt in degrees. Pearson R correlations were calculated for talar tilt and DPSI composite scores. There was no significant correlation between the variables, (R= 0.10, p=0.37). Ankle ligament laxity does not appear related to DPSI composite score, indicating these are two distinct constructs. Future studies should correlate medial-lateral postural stability indices to talar tilt, since the ankle's ligaments protect it from medial-lateral instability during a jump in the same direction as talar tilt.

Music, Metaphorical Language, and Expanding Thought Networks in Shelley's "To a Skylark"

Katherine Arnold
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Percy Shelley was a Romantic poet and literary figure interested in the sources of a poet's creativity and the inner processes of the imagination. He developed his ideas in a poem, "To a Skylark," in which he invokes music as a metaphor for inspiration. Through the metaphors and metre of language, the poem attempts to affect the reader's thought pattern in a manner similar to the musical forms composed concurrently by Felix Mendelssohn. This paper examines sources in musical criticism, literary criticism, and cognitive science in order to identify the similarities in Shelley's and Mendelssohn's works. Specifically, Mendelssohn's musical forms interact with a listener's working memory and rely on the listener to develop a musical theme across movements of a composition. This interaction relates to the cognitive processes pertaining to metaphors like those created in Shelley's poem. Both artists, responding to the intellectual movements of subjectivity and organicism, created works that convey a unity of thought while resulting in a thematic transformation across a piece. Placing Shelley's poem in a medium both literary and musical allows for a new interpretation and understanding of the poem's abstract images and sources of energy in relation to the reader's cognitive process.

Evaluation of Live Virally-Vectored Vaccine for Malaria in Murine Model

Alexandra Auger
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Malaria is a vector borne infectious disease common in tropical regions caused by *Plasmodium falciparum*. Nearly a million people, the majority children, die from the disease each year. The majority of cases occur in developing nations where prophylaxis medications and treatments may be too costly or difficult to administer. Despite the great need, no effective vaccine is currently available. This study evaluates the effectiveness of a live viral vector vaccine administered intranasally. MSP 4 and 5 are merozoite surface proteins that were chosen to target infection and incorporated into the parainfluenza virus, PIV5. In the current experiment, ten mice were administered the vaccine, ten mice received only the vector without MSP 4 and 5, and ten mice received PBS as a control. The thirty mice were then infected with 10^3 *Plasmodium Berghei* ANKA, which parallels human malarial infection, to evaluate the effectiveness of the vaccine. The mice were monitored daily for anemia, parasitemia levels, weight loss, behavioral changes, and development of cerebral malaria. All but one of the vaccinated mice succumbed to cerebral malaria by day eight of infection. Currently, the antibody response of the vaccinated mice is being evaluated through immunofluorescence assay. Although the vaccine did not prevent fatality, the vector may still be useful with a different antigen if an antibody response is present. More research is needed to determine if the vaccine has the potential to be effective against malaria.

Abstracts

Groundwater in Sub-Saharan Africa
William Austin II, CURO Summer Fellow
Dr. William Kisaalita, College of Engineering

Global warming and climate change have greatly impacted small-scale farmers in Sub-Saharan Africa. The continent's populations traditionally relied upon groundwater. Groundwater has very slow natural replenishment rates, inevitably causing continental water tables to sink as water sources are exhausted. The declining water tables have led towards even faster climatic change for various regions, particularly East Africa. New practices are slowly being adopted within Sub-Saharan Africa. We collected field data in Tanzania to measure the adverse effects of the changing climate on small-scale farmers while analyzing and promoting alternatives to combat the negative environmental outcomes. Much of the data was collected in an effort to decrease dependence on ground water through sustainable sources—primarily rain catchments and water storage tanks. We were able to calculate the additional energy placed into an environment through the utilization of roof catchments. Additionally, we are analyzing the benefits of small-scale conservation agriculture to trap water within the soil, preventing environmental degradation. Our research has confirmed that small-scale farmers are at the mercy of changing weather patterns and that the adverse effects can be overcome through a shift away from groundwater towards alternative sources of water. If stronger affirmative action is not adopted in the near future, mass water shortages will likely become magnified.

Perspectives on Postnationalism in Chilean *Nueva Canción*
Christina Azahar, CURO Honors Scholar, CURO Graduation Distinction
Dr. Susan Thomas, Hugh Hodgson School of Music

The Chilean *nueva canción* movement provides in its rich artistic innovation and far-reaching sociopolitical influence a unique opportunity to examine the theories and questions of postnational musical scholarship. This paper uses the framework of Ignacio Corona and Alejandro L. Madrid's book *Postnational Musical Identities: Cultural Production, Distribution, and Consumption in a Globalized Scenario* to study *nueva canción*'s role in the formation of Chilean nationalist identity. The authors argue that "the invention of narratives of tradition, heritage, and myth" to construct a nationalist identity is an essential component of postnational scholarship, and in the context of Chile in the late 1960s and 1970s, these narratives were invented largely through the cosmopolitan practices of prominent *nueva canción* figures such as Violeta Parra and Victor Jara. Both artists used genres and traditions from a wide variety of marginalized cultures throughout Latin America to inform their socially conscious musical output. This cosmopolitan perspective on social and cultural issues, as well as the movement's national and international political affiliations, caused Chilean *nueva canción* to play a major role in the construction of pan-Latin American identity – ultimately making it transcend classification within the nation-state of Chile. Violeta Parra's early ties with Andean folkloric-popular music in Argentina and France, Victor Jara's move towards nationalism and political activism, and Luis Advis's innovative *Cantata Santa María de Iquique* are each demonstrated in this study to be a response to the postnational condition of Chile and Latin America as a whole.

Abstracts

Popular and Folk Medicine: Towards an Understanding of the Latino Health Paradox

Christine Bassett
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Social science and anthropology recognize that local perceptions, social expectations, and behavior shape human health. The Latino health paradox references an epidemiological phenomenon where Latino immigrants, despite low socioeconomic status, exhibit good health outcomes while second generation Latinos with similar socioeconomic status experience deteriorating health outcomes. Research indicates that a loss of cultural knowledge associated with migration facilitates these outcomes. This study proposes that traditional medical knowledge serves as a buffer to environmental stressors and, in its absence, produces differential health outcomes in Latino communities. Data was collected using qualitative methods, largely structured and semi-structured interviews, with women living in Georgia who self-identified as Mexican. Interviews on topics related to maternal and child health were conducted in Spanish or English, transcribed, translated if necessary, and analyzed to identify key themes on health care practices. Results indicate that Mexican migrants integrate both biomedical and traditional remedies into their healthcare regimen. Results also imply that social networks, primarily family, serve as a vital source of health-related information. Finally, the study suggests a need for more intense research that would seek to recognize if higher reliance on traditional medical knowledge produces differential health outcomes compared to those who predominantly access biomedical healthcare strategies. A deeper understanding of the Latino health paradox would assist in transitioning towards a more holistic, individualized healthcare system and consequently facilitate better health outcomes in migrant communities.

Expression of PECAM in EHD

Elizabeth Beadles
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Epizootic hemorrhagic disease (EHD), caused by a midge-transmitted orbivirus, is the most prevalent and often fatal infectious disease of white-tailed deer in the United States. The causative virus, epizootic hemorrhagic disease virus (EHDV), infects and destroys endothelial cells lining the microvasculature causing hemorrhage, but this destruction curiously elicits very little inflammation. Failure to elicit an inflammatory response may allow the virus to spread within the microvasculature and may help explain why infection is often fatal. CD31 (PECAM) is a cell adhesion molecule that plays a fundamental role in maintaining homeostasis in blood vessels through the transport of white blood cells into and out of the cell and is found on the surface and around intercellular junctions of endothelial cells. We hypothesize that low baseline levels of PECAM, or its destruction or impairment by viral infection, is partially responsible for the susceptibility of deer to EHDV. Our objective was to develop methods to quantitate expression of PECAM in deer (both normal and EHDV infected) in order to determine its specific role and/or any correlation between its expression and the disease. We have developed and are standardizing an immunohistochemical technique to quantify PECAM protein and a rtPCR technique to evaluate its mRNA in deer tissues. These techniques will allow us to evaluate PECAM expression in a wide range of tissues from normal and EHDV infected deer in order to address our hypothesis. Our findings may also help explain the pathogenesis of certain viral hemorrhagic diseases of humans.

Abstracts

Effect of Muscadine and Concord Grape Juice Phenolics on the Oxidation of LDL

J. Taylor Bellamy
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The oxidation of LDL is an important contributor to the pathogenesis of atherosclerosis and heart disease. In this disease state, oxidized LDL is thought to promote both the accumulation of cholesterol in macrophages and the recruitment of immune cells into the atherosclerotic plaque. One intervention that may preclude the accumulation of atherosclerotic plaque and therefore arrest the development of heart disease is the dietary consumption of antioxidant foods. Muscadine and Concord grape juices contain significant amounts of phenolic compounds known to have substantial antioxidant effects. To analyze and compare the effect of these grape juices on LDL oxidation, a model system of LDL oxidation was employed using cupric sulfate, a transition metal. The amount of oxidation was determined by measuring the formation of lipid oxidized products employing the TBARS (thiobarbituric acid reactive substances) assay. At equal phenolic concentrations of 10 and 25 μg phenolics/mL (concentrations less than 5% v/v), the Concord grape samples exhibited substantial inhibition of oxidation while the muscadine grape samples were not effective. At equivalent antioxidant capacities, the muscadine grape samples again failed to inhibit LDL oxidation; Concord grape samples at the same concentration demonstrated significant inhibition. However, at a 5% (v/v) concentration, muscadine juice did inhibit LDL oxidation. While the presence of significant amounts of polyphenolics in muscadine grapes would suggest an ability to inhibit LDL oxidation in vitro, these experiments demonstrate that muscadine juice is a relatively ineffective inhibitor of LDL oxidation. Further research will analyze the specific constituents found in muscadine juice and examine whether any of them possess pro-oxidative properties.

Election Triggers: How a Sip of Water Can Ruin a Campaign

Hania Bisat
Dr. Leonard Martin, Psychology, Franklin College of Arts & Sciences

Sometimes, candidates for political office rise or fall in popularity based on seemingly insignificant events (e.g., Mark Rubio taking a sip of water during his speech). Other times, they remain popular no matter what happens to them (e.g., Clinton, Reagan). We wanted to understand why. We presented participants with brief descriptions of five fictitious candidates and asked them to rank order the candidates in terms of preference. Then, we presented them with additional information about their first and third choice candidates. This information came in the form of news stories, or "triggers," covering succeeding weeks of the campaign. Participants evaluated the candidates after each set of stories. For the last story, participants read that either their first or third choice candidate had referred to his constituents as hillbillies (questioning the candidate's electability) or had ignored his sick mother to stay on the campaign trail (questioning the candidate's values). We submitted the participants' ratings to a 2 X 2 X 2 repeated measures ANOVA (1st or 3rd choice candidate X electability or values trigger X Week 1 and Week 2). Preliminary analysis suggested that although participants gave higher ratings for their first vs. third choice candidate both initially and after the negative trigger, only their opinion of their first choice candidate dropped significantly. Also, the effect of the values-related trigger was stronger than the trigger pertaining to electability. These findings could be useful to campaign managers as they try to help their candidates cope with events that could derail their candidacy.

Abstracts

The Aversion to Condom Use in an HIV-Saturated World

Conner Blackwell, CURO Summer Fellow
Dr. Darius Ornston, International Affairs, School of Public & International Affairs

The Human Immunodeficiency Virus (HIV) has grown to become a pandemic since its first diagnosis in 1981. Since then, the virus has become a plague in the impoverished world. In Tanzania, the focus of this research, 3.3% of the population is living with the virus, but in some regions, the rate climbs to 16%. On the other hand, only .4% of Americans are currently living with HIV. The only way to prevent the transmission of the virus while remaining sexually active is through the use of a condom. However, the Tanzanian government reports "low and inconsistent" condom use despite its large sex education and condom distribution campaigns. What societal factor is holding Tanzanians from using condoms? My research aimed to expel all possible differences between America (90% of sexually-active Americans report having used a condom) and Tanzania that could explain the discrepancy in condom use in order to find a singular factor that unified all of the effects through one over-arching cause. Through analysis of HIV reports from the World Health Organization and UNAIDS, and by utilizing anthropological observations from fieldwork in Tanzania, I have concluded that this over-arching factor blocking condom proliferation is gender inequality. By recognizing the cause, it becomes easier to locate a solution to the low condom use.

Striated-Fiber Assemblin in Tetrahymena

Conner Blackwell, CURO Summer Fellow
Dr. Boris Striepen, Cellular Biology, Franklin College of Arts & Sciences

Prior research into the role of the Striated-Fiber Assemblin (SFA) protein has shown that it plays an essential role in the placement of Micro-tubule Organizing Centers (MTOC). In some organisms, this has totally depleted the possibility of reproduction. To confirm these previous findings, we have extended the study into Tetrahymena, a ciliate protozoan whose cilia grow from MTOC's that are similar to the ones from previous studies. We hypothesized that knocking out the SFA protein would disrupt the placement of MTOC's and thus immobilize the organisms. The knock-out comes from recombination of a plasmid that we construct containing Neomyacin resistance instead of coding for the SFA protein. The successful transformations will survive on a Neomyacin-coated plate and will be qualitatively studied for loss of cilia or loss of function. These results are not yet available due to the time it takes to construct the plasmid. If the SFA protein performs the hypothesized function, it will be a drug target for such diseases as malaria, cryptosporidosis, and toxoplasmis.

The Overexpression of Long Flagella Protein 4 in *Tetrahymena thermophila*

Stephen Bocarro, CURO Summer Fellow
Dr. Jacek Gaertig, Cellular Biology, Franklin College of Arts & Sciences

Microtubules mediate the majority of the movements of organelles in eukaryotic cells. One of the organelles in cells that microtubules directly mediate the movement of is the cilium. Studies in *Chlamydomonas reinhardtii* have shown that the Long Flagella protein 4(LF4) is a negative regulator of cilia length. Using a GFP tag, LF4-GFP was overexpressed in the protist, *Tetrahymena thermophila,* and shown to also negatively regulate cilia length in a pathway similar to that of Intraflagella transport (IFT) mutants. IFT proteins work in complexes near the axoneme, the base of the cilium in the main cell body. Due to the similarity between IFT and LF4 mutants, it can be elucidated that LF4 works as an inhibitor of cilia elongation and possibly of the IFT complex. By comparing the rate of growth of growing versus starved cells, we were able to establish

that the turnover rate of proteins transcending the cilia is being affected by the overexpression of LF4. We went on to establish a time at which LF4 had stopped movement in *Tetrahymena* cells while the cells still retained some length in their cilia. This would show that LF4 is affecting the turnover rate in cilia and actively stopping their movement.

Examination of Age as a Moderator of the Relationship between Sleep Quality and Job Satisfaction

Carley Borrelli
Dr. Lillian Eby, Psychology, Franklin College of Arts & Sciences

Prior studies have indicated that sleep loss results in decreased overall mood (Blagrove & Akehurst, 2001; Mastin et al., 2005). By extension, spillover theory (Staines, 1980) predicts that poor sleep quality may likewise predict lower job satisfaction. The current study examines this relationship. Moreover, existing studies have not examined how factors such as age affect the relationship between sleep quality and affective reactions, such as job satisfaction. One body of research has shown that the effectiveness of the circulatory system declines with age, resulting in lower core body temperature and disrupted sleep at night (Patlak, 2005). The purpose of this study is to determine how age moderates the relationship between sleep quality and job satisfaction. This study includes data collected from 1054 counselors from substance abuse treatment centers across the United States. The results showed that while age (B=.061, p <.045) and sleep quality (B=.203, p<.00) are negatively related to job satisfaction, age does not moderate the relationship between sleep and job satisfaction (F Change = 16.43, n.s.). Therefore, the study does not support the hypothesis that the relationship between sleep and job satisfaction is moderated by age. This research helps to develop a better understanding of the relationship between sleep, job satisfaction, and age.

Carley N. Borrelli, Hannah B. Spell, Ph.D., Lillian T. Eby, Ph.D. & Jessica L. Muilenberg, Ph.D.

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The "Darlton" Initiative: Serial Complexity, Parallel Media Narratives, and Showrunner Tactics in *LOST*

Brendan Boyle
Dr. Horace Newcomb, Grady College of Journalism & Mass Communication

ABC's *LOST* was a rare success for network television that drew a wide and enthusiastic audience for six seasons despite a complex narrative involving one of primetime's largest acting ensembles, high-concept science fiction storytelling, and weekly episodic structure that built in regular trips back and forward in time. Showrunners Damon Lindelof and Carlton Cuse, who acted as head writers and executive producers throughout the series' run, helped fans engage with the show's complexity through the creation of their own media personalities. An examination of their appearances on panels at events like Comic-Con and their official podcast, as well as the industrial circumstances surrounding the showrunners' decision to fix the series' end date in advance, grants a greater understanding of how Cuse and Lindelof were able to use the complexity of the narrative to engage with fans both as part of a larger

public relations exercise and a way to achieve greater influence in dealings with network executives. This case study works as a paradigmatic example of how television's new breed of creative-executives gain power within existing management structures during a period of upheaval in the traditional network model, a synthesis of two roles in the production process at a level of exposure which may never be repeated.

Spousal Healthcare Disparities between LGBTQ Federal Employees and Their Heterosexual Coworkers

Kathryn Bridges
Dr. Meghan Skira, Economics, Terry College of Business

This presentation will highlight the methodologies and findings of my current research project focused on spousal healthcare disparities between LGBTQ federal employees and their heterosexual coworkers. This research seeks to predict and analyze the costs that federal LGBTQ employees must incur to cover spouses' healthcare. While their heterosexual counterparts can either opt into a federal plan for their spouse or receive a tax break on the dollar amount that they contribute toward an insurance plan, LGBTQ individuals, even when legally married, do not get this benefit as a result of Section 3 of the Defense of Marriage Act (DOMA). First, I seek to use the 2012 Federal Employee Viewpoint Survey (FEVS) to identify the number of LGBTQ employees currently working in the federal government. From here, I will seek to address health concerns faced by LGBTQ individuals, specifically highlighting the costs of purchasing private market individual plans for spouses. Lastly, I seek to estimate a lump sum that this coverage costs LGBTQ families ever year, and discuss the strain that puts on families, as well as the economic effect it would have on the government if they chose to provide benefits. This estimate will be based largely in current court cases addressing this disparity, including plaintiffs in "Pederson v. OPM," set to be heard by the Supreme Court in March. In addition, the study situates this disparity within larger current federal legislation concerning lesbian and gay individuals' marriage and domestic partnership rights.

Synthetic and Enzymatic Decarboxylation of Tyrosine Derivatives

Callan Brownfield, Robert Ashley
Dr. Richard Morrison, Chemistry, Franklin College of Arts & Sciences

L-DOPA, a derivative of the amino acid tyrosine, is converted to the neurotransmitter dopamine in the human body by the DOPA decarboxylase enzyme. Extant laboratory methods for comparable decarboxylations are laborious, inefficient, and few in number. We describe the development of a microwave-promoted method to accomplish a high yield and facile decarboxylation of L-DOPA and other amino acid precursors to their corresponding amines. The amino acid or amino acid derivative is placed in a glass microwave vessel along with a catalyst in a methanol solution, and refluxed until no visible amino acid remains. Upon completion, the catalyst can then be completely recovered from the reaction. Amines are purified by simple extraction and isolated as HCl salts of the desired neurotransmitters. The method is general for most natural amino acids and for all tyrosine derivatives that were studied. Recent research involves efforts to determine if structurally similar tyrosine derivatives can be converted to their respective amines enzymatically by DOPA decarboxylase. As potential drug targets, these compounds could theoretically be delivered in amino acid form and decarboxylated to the corresponding amine in vivo. Future research efforts entail analysis of the bioactivity of unnatural derivatives of the amino acid tyrosine. HPLC comparison of the enzyme digests to the synthetic amine standards will reveal the

general efficacy of our synthetic methodology.

Developing a Nutrition Intervention Program for College Female Freshmen Using Social Media

Alixanna Burg
Dr. Rebecca Mullis, Foods & Nutrition, College of Family & Consumer Sciences

For many college freshmen this is the first time they have been solely responsible for their nutritional well-being. However, many of them have little knowledge of nutrition and healthy eating habits, making it difficult for them to navigate the myriad of food choices within a busy academic and social schedule. This study investigated whether having easily accessible and relevant nutrition information during the first year of college helped increase healthy eating habits. A focus group was conducted and ten topics were identified for the intervention to address. A social media intervention was developed using a blog to post the content of the nutrition lessons. The blog was then linked to a Facebook group that reminded participants to view the lessons. A pre- and post-test were administered online to ten study participants to measure their improvement in both knowledge and behavior. Results showed that five out of six participants who completed at least one of the blog lessons improved their overall knowledge and behavior score. Topics that showed improvement in knowledge included dining hall symbols (17.5% increase) and food labels (10% increase), and topics that showed improvement in behavior changes included dining hall information (20% increase), dietary guideline requirements (18.8% increase), and eating out (43% increase). Though the results from this study are limited by a small sample size, they show the potential that a nutrition intervention using social media can improve access to and use of reliable nutrition information for college freshmen. Further study using a larger sample size is recommended.

Anesthetic Complications in Dogs Undergoing Surgery for Liver Disease

Brigid Burns
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A dog with ongoing biliary disease may undergo a surgical procedure called a cholecystectomy, in which the gallbladder is completely removed. In the authors' clinical experience, patients with gallbladder disease tend to have a higher incidence of complications during anesthesia, including hypotension during manipulation of the gallbladder or following cholecystectomy. The purpose of this retrospective case-control study is to determine if there is a difference in the incidence of anesthetic complications between dogs with hepatic disease undergoing cholecystectomy compared to dogs undergoing other types of hepatic surgery. The hypothesis was that dogs that receive cholecystectomies would suffer a greater number of anesthesia complications than dogs that do not undergo cholecystectomy. By analyzing the medical records of dogs that underwent exploratory laparotomy for surgical management of liver disease at the UGA Small Animal Teaching Hospital, it was found that dogs that had cholecystectomy had longer anesthesia durations and longer surgery durations than dogs that did not have cholecystectomy. No significant differences existed for temperature nadir (94.6 vs 95.6 ºF; non-cholecystectomy vs cholecystectomy), final temperature (96.1 vs 96.7 ºF), time to extubation (29.5 vs 48.9 min), duration of hypotension (26.8 vs 20.8 min), or blood pressure nadir (53.3 vs 51.4 mmHg). Hypotension occurred in 66% and 74% and inotropes were used in 64% and 53%, for non-cholecystectomy and cholecystectomy patients, respectively. Dogs undergoing liver surgery for cholecystectomy did not suffer a greater number of anesthesia complications than dogs without cholecystectomies.

Abstracts

Where a Kid Can Be a Kid, Even When She's an Adult - The Internet's Role in Sustaining Engagement with Children's Television

Matt Burns
Dr. Alison Alexander, Grady College of Journalism & Mass Communication

For years, programming models insisted that children's television series aired 65 episodes, re-ran for a few years, and then disappeared into the recesses of viewers' memories. Now online video streaming allows nearly any television episode ever produced to be viewed instantly at any time, and social media outlets encourage users to share, discuss, and demand this content. With several media corporations currently riding a wave of nostalgia by reviving children's television franchises from the 1990s, this research sought to discover how and why college students are engaging with children's television, and if this sustained engagement can impact the ways media companies consider their programs' lifespans. This article reports the findings of an online survey (n = 332) that assessed methods and motivations, as categorized by Askwith (2007), that college students reported for engaging with children's television. Engagement with children's television in college is common (69%), but students are unlikely to pay for the content. Traditional television broadcasts remain an essential component of a show's longevity. Drawing from Uses and Gratifications Theory, respondents' motivations for viewing children's television in adulthood revealed three unique factors labeled Entertainment, Nostalgia, and "Closeted Masters." At a small but significant level, childhood engagement with children's television predicted adult engagement. More specifically, students who as children played in imaginary worlds, called paracosms, based on children's television were much more likely to sustain their engagement as adults.

The Excommunication of Early Jewish Christians and Its Interpretive Value for the So-called Temple Cleansing in the Gospel of John

Joanna Caffrey
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The alleged excommunication of early Jewish Christians from the synagogue and the mention of such a phenomenon in John chapter nine most notably, as well as in other passages in the Gospel of John, has long been and continues to be an extensively debated topic in Johannine studies. Each occurrence of such a reference contains key words that are consistently connected either directly or indirectly to this expulsion when they occur in the Fourth Gospel, with the previously assumed exception of the use of the word "*ekballo*" in chapter two of the Gospel of John. This research proposes that the presence of "*ekballo*" in chapter two should not be seen as an exception, but rather as a purposeful reference to the subsequently mentioned excommunication, and therefore as an interpretive tool for the literary understanding of the so-called temple cleansing. The methodology involves examination of literary and historical aspects of the primary text in question. The significance of this research is that it will provide new information concerning the manner in which the author of the Gospel of John responded to conflicts between early Jewish Christians and Jews outside of the Christian movement.

Vocal Intonation as a Social Referencing Cue in Infants and African Grey Parrots

Rachel Callery
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The proposed comparative study will investigate social referencing capabilities in 12- and 16-months old infants, as well as speech-using African Grey parrots. A choice

paradigm involving intonation cues and pairs of baited containers will be used. The experimenter will glance first into one container and then the other while vocalizing a high-rising (positive), low-falling (negative), or monotone (neutral) sound. The two containers will then be presented, and the preference (i.e., container first explored) recorded. We predict the 12-months age group will demonstrate no container preference, needing more experience with referential associations in order to use the cues. By 16 months, however, infants readily use caregiver affect, facial expressions, and pointing to assess novel objects. This older group should therefore explore positive intonation containers more often than negative or monotone containers. Further, we will investigate the preference patterns of speech-using African Greys, which are attentive to their caregivers' vocalizations and so may use intonation as a cue. Data collection is currently underway. This study will show for the first time whether the ability to use intonation as a social-referencing cue (1) appears in a nonhuman, and (2) develops in humans around the same time as other social referencing cues.

Classifying the Legitimacy of Malicious Domains for Safer Internet Browsing

Tiffany Cauthen
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In this project, we aim to detect malicious domains by leveraging search engines to collect a sense of Internet sentiment about domain names. Domain names conveniently allow Internet users to browse the Internet using easy-to-remember alphanumeric strings rather than the numeric IP addresses browsers need to connect to the right web server. Unfortunately, attackers also use domain names to steal from and infect users. These attackers transmit data, control bots, and facilitate other malevolent actions against Internet users, usually registering under false credentials. Our hypothesis is that collective Internet knowledge about a domain name will appear differently, depending on whether the domain name is used for malicious or legitimate purposes. For example, consider domain name *d* as a keyword. We collect information on which websites refer to *d* and, based on the results, perform the classification. Although current anti-malware programs have their own malicious content databases and other network-security research explores alternative ways to classify malevolent sources, our research hopes this previously unexplored method will prove probabilistically advantageous as an additional method of malicious domain name classification and provide valuable insight into how attackers create their criminal networks. We can currently classify domain names with an accuracy of about 87%. Malicious domain names are growing exponentially and continue to cause harm on unsuspecting victims. Our research hopes to create a way to accurately determine the legitimacy of domain names to impede the efforts of attackers and speed the process of warning Internet users of these malevolent domain names.

Increasing Georgian Household Participation in the Banking System

Jesse Chan, Foundation Fellow
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Checking and savings accounts are conveniences many U.S. households exercise to meet their financial needs; these accounts are used to receive wages and salaries, pay utility and telephone bills, and are vehicles for saving funds for future events. A 2011 FDIC study indicated that 8.2% of all U.S. households were unbanked and 20.1% of households were underbanked. Unbanked households can least afford the pricey alternative financial services they consume, and their exclusion from the traditional banking system puts them at a severe financial disadvantage in developing savings. This

paper assessed policy alternatives to alleviate the problems and symptoms related to a high level of unbanked and underbanked households in Georgia: 1) maintaining the status quo, 2) supporting the creation of locally-focused financial literacy programs, 3) increased pricing transparency for financial services from all providers, and 4) regulating the order in which financial institutions process transactions for retail checking accounts. Each policy alternative was evaluated based on its ability to achieve three goals: 1) improve awareness of banking services, 2) improve confidence with conducting banking transactions, and 3) ultimately reducing the number of unbanked and underbanked households. After evaluation, the recommended proposed policy to help bring more unbanked and underbanked households into the mainstream banking system is support of financial literacy programs. Challenges of implementation include its relative difficulty to scale, funding challenges, and its approach to unbanked and underbanked levels through education, an indirect approach to solving the issue of unbanked and underbanked households in the United States and Georgia.

The Origin of Unusual Phosphate Deposits on the Venezuelan Island of Gran Roque, Leeward Antilles

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The Leeward Antilles island of Gran Roque contains phosphate deposits that replaced the rinds of spheroidally weathered gabbro. The mineralogy and geochronology of the deposits were studied in order to interpret their origin. X-ray diffraction results indicate that the deposits consist principally of phosphate minerals variscite, phosphosiderite, and strengite. The island's mafic bedrock has been interpreted as an exposure of the Caribbean Plate, which formed in the Late Cretaceous when oceanic plateau magmatism thickened Pacific oceanic crust. The petrography, geochemistry, and age (87.0 ± 4.1 Ma) of the mafic complex are similar to those of other exposures of the Caribbean Plate, including the nearby islands of Aruba and Curaçao. The upper constraint for the age of the phosphates is given by the quartz diorite (65.6 ± 1.4 Ma) and pegmatite (65.3 ± 0.91 Ma) that intrude and postdate the phosphatized mafic complex. U-Pb dating of zircons from the pegmatite was carried out by laser ablation inductively coupled plasma mass spectrometry. The intrusions themselves are not phosphatized, demonstrating phosphate formation between ca 87 Ma and 65 Ma. This time period is consistent with the periods of subaerial weathering as documented for the Caribbean Plate exposures on Aruba and Curaçao. We interpret that the rinds of phosphate formed when rainwater leached guano deposits and reacted with the weathered mafic complex, resulting in the unusual suite of phosphate minerals. Similar modern processes have been observed and described from other localities, but to our knowledge this is the oldest well-documented example.

Democratic Dialogue: Comparing Presidential Debate Content and User-Generated Comments in Online News

Savannah Colbert
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Will there be common themes between the material candidates discuss in the presidential debates and the discussion about the debates by online news respondents? Using content analysis of presidential debate transcripts and online user-generated comments (UGC) about the debates, frames and themes were identified by two coders. The stratified random sample of 1,600 UGC was developed from comments following six articles about the 2012 presidential debates. To avoid skews in the data, one historically conservative newspaper (*The Wall Street Journal*, N = 1,111)

and one historically liberal paper (*The New York Times*, N = 489) were sampled for UGC following each of the three 2012 presidential debates. Based on a pretest, debate and UGC contents appear to be remarkably different. Most UGC express a strong opinion about a candidate while the debate content focuses on specific issues facing the U.S. It is further anticipated that user-generated comments about the presidential debates will be more partisan than the debates themselves, which will focus more on national issues and solutions or policies. UGC provide an important forum for citizens to voice their opinions as political participants in their democracy. Furthermore, the media is increasingly reliant on UGC to spur interest in news content. All the information used in the study was publicly posted or broadcast information, so there are no ethical issues in this content analysis study.

Exploring the Use of Comprehensive Nutrition Education Programs as a Means of Addressing Food Insecurity in Georgia

Carol Conroy
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Food insecurity persists as one of the most pressing public health issues in Georgia. As defined by the United States Department of Agriculture (USDA), food insecurity suggests that an individual or family either consistently or periodically does not have access to enough food to lead a healthy, active life. In Georgia, approximately 16.9 percent of households experience food insecurity. The Supplemental Nutrition Assistance Program (SNAP) is the most broad federal food assistance program, benefitting approximately 45.8 million people in the United States. This program is coupled with an optional nutrition education initiative, SNAP Education Program (SNAP-Ed), which promotes the adoption of healthy eating habits and an active lifestyle as a means of preventing obesity and chronic illness. The education program is funded through the SNAP-Ed grant and can be administered to Cooperative Extension Services at any land grant university (LGU). The University of Georgia is the only LGU in Georgia and operates nutrition education programs in county offices across the state. Although the Cooperative Extension currently offers education services to all populations through the Expanded Food and Nutrition Education Program (EPNEP), it does not receive SNAP-Ed funding and therefore cannot adequately serve all SNAP beneficiaries. This paper evaluates current policy failures as well as proposes policy alternatives. By reapplying for the SNAP-Ed grant in addition to its existing grant funding, the Cooperative Extension will have an opportunity to extend services to a broader population of SNAP recipients and provide a more comprehensive nutrition education program for the state.

Second Law of Thermodynamics Efficiency Analyses of High-voltage Electricity Transmission

Kevin Cown
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The objective of this research is to determine the feasibility of conducting a second law of thermodynamics efficiency analysis of high-voltage electricity transmission. The efforts are to use exergy in conjunction with a second law efficiency. This will be done in addition to a first law of thermodynamics efficiency analysis. It is anticipated that the results of this analysis will reveal valuable insight concerning electricity transmission that is not commonly understood. The experimental model consists of an arbitrary section of high-voltage transmission cable with associated energy input and output. Quantification of this energy flow is not entirely understood at this point, and literature search for related study that may provide further knowledge is ongoing. This research is based on input-output analysis of the closed system under investigation. The goal is to reach a conclusion that could be environmentally

beneficial. Electricity transmission lines are the conveyance systems by which electrical power is distributed to the user from the generation site. Electricity generation has negative environmental consequences including coal combustion emissions, nuclear wastes, and increasing infrastructure real estate demands. Transmission losses of this environmentally expensive, high-quality energy could be further reduced with system designs based upon theoretical models derived from second law analyses.

When is a Kiss a Thimble? Sexuality in Adaptations of *Peter Pan* Over Time

Maria Cox, CURO Honors Scholar, Foundation Fellow
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The character of Peter Pan first took the stage in 1904 and has become a symbol of eternal youth, leading Wendy Darling and her brothers to Never Land, a paradise of pirates, Indians, and adventurous Lost Boys. In Barrie's treatise on childhood, Wendy learns through her adventures in Never Land that she must grow up, but before she even learns to fly, she tries to give her new friend Peter a kiss. Yet Peter, the boy who has no parents, does not know what a "kiss" is. Thinking a kiss is an object, he holds out his hand, leading Wendy to give him a thimble instead. With this gesture Barrie addresses childhood romance, Wendy's transition to adolescent sexuality, and the importance of love. A kiss can represent the rewards of maturity, and when it is eliminated, so too are the positive aspects of adulthood. Barrie expanded on these themes in his novelization of the tale, *Peter and Wendy* in 1911. This novel by Barrie is the most fully realized version of *Peter Pan*. How this scene is cut, changed, or reproduced in over a century of film adaptations shows a growing interest in these themes of love and romance. How the adaptations address them allows the viewer to think about the original in a new way. My research shows that the live-action *Peter Pan* (2003) is the most faithful adaptation of the novel, encompassing the thematic elements of "The Kiss" most effectively. This project uses materials from the University of Georgia Libraries' Peabody Collection.

Proteomic Analysis of the Tomato/ *Botrytis cineria* Interaction

Dervin Cunningham, CURO Honors Scholar, CURO Summer Fellow
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Botrytis cinerea attributes to the post-harvest rot of more than 200 species of fruits and vegetables. As these produce ripen, their cellular wall drastically degrades, making them more susceptible to pathogens. Significant protein-protein interactions occur between the necrotrophic fungal pathogen, *Botrytis cinerea*, and the tomato fruit. By describing host and pathogen proteomes simultaneously in infected tissues, the plant proteins that provide resistance and allow susceptibility and the pathogen proteins that promote colonization and facilitate quiescence can be identified. This study is aimed to characterize the fruit and fungal proteins occurring in the tomato/*B. cinerea* interaction using shotgun proteomics. Mature green, red ripe, wild type and *rin* and *nor* mutant tomato fruit were infected with *B. cinerea* B05.10. After 5 days the infected tomatoes were gently agitated in a 1.5M NaCl solution followed by a SDS and heat treatment to collect solubilized proteins. The collected proteins were separated on a one dimensional SDS-PAGE gel, followed by in-gel digestion. Peptides were then analyzed by LC-MS/MS on a linear ion trap mass spectrometer. Data was searched using Mascot algorithm. Proteins were identified by combining the *B. cinerea* BO5.10 (Broad Institute, MA), and T4 databases (Genoscope, France) with a tomato protein database (SOL Genomics Network, Cornell University, NY). A decoy database was constructed by

reversing the sequences in this target database. Statistically significant proteins were determined at a 1% protein FDR. The composition of the collected proteins populations and their putative functions allow for a better understanding of the plant-pathogen interaction mechanism.

A Therapeutic Nanoparticle Platform for Ischemic Brain Injury

Kasey Darley
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Stroke is the number one cause of long-term disability and the third leading cause of death in the United States. Despite a concerted effort by medical and research communities to develop therapeutics, there are few treatments and no cure. Neuro-protectants such as mitochondria acting antioxidants that shield the brain from cytotoxic effects caused by stroke have shown significant promise in rodent stroke models, but by themselves have not translated to a viable treatment in human patients. One limitation of antioxidant treatments is that they offer little in the way of tissue regeneration, which would lead to the re-growth of lost neural networks and recovery of cognitive, sensory and motor function. This has led to significant increase in the development of regenerative neural stem cell therapies that would be able to differentiate and form new networks leading to improved recovery. Neural injury often leads to a toxic environment not conducive to tissue regeneration including the expression of reactive oxygen species (ROS) and inflammatory cytokines. Advances in regenerative medicine focusing on the development of multifunctional nanoparticles (NPs) for delivery of synergistic antioxidants and anti-inflammatory agents to the mitochondria of cells followed by treatment with embryonic and induced pluripotent stem cells capable of differentiating into function neural progenitors can provide a platform technology to create a robust neural regenerative therapeutic system. In this presentation, we will demonstrate a novel combination treatment of mitochondrial targeted NP mediated delivery of synergistic antioxidant and anti-inflammatory agents and induced pluripotent stem cell derived neural stem cell therapy.

Trinucleotide Insertion and Deletion in TgTPC1 cDNA

Jay Dasigi
Dr. Silvia Moreno, Cellular Biology, Franklin College of Arts & Sciences

Toxoplasma gondii is an apicomplexan parasite, which can be grown in the laboratory in large quantities and is readily amenable to genetic manipulation. In an effort to better understand calcium homeostasis in this parasite, the two-pore channel TgTPC1 was studied. Two-pore channels are receptor complexes that have been recently discovered to release Ca2+ in response to NAADP. While trying to clone the gene coding for TgTPC1 in *T. gondii*, the results suggested that one TgTPC1 gene may be able to produce three different mRNAs (+3 nucleotides, wild type, and -3 nucleotides) by trinucleotide insertion and deletion. To further characterize this phenomenon, *in vitro* methods were used to exclude the possibility of an *in vitro* amplification artifact, and to confirm that there are 3 different populations of mRNAs. The different populations of the cDNAs were studied by direct cloning/sequencing, with a sequenced cDNA construct containing three extra nucleotides and the cloned genomic DNA used as controls. It is expected that there will be only one population of TOPO clones from the two controls, and that a different population of cDNA can be identified by direct sequencing the cloned RT-PCR products. This work suggests that *T. gondii* can produce 3 different proteins from one gene. There are more than a dozen neurological dysfunction diseases caused by trinucleotide expansion. Although DNA replication slippage has been widely accepted,

this is the first evidence that there is also transcription slippage. This work will shed new light on the molecular mechanisms of these neurological diseases.

Topology of the Ras Converting Enzyme
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The Ras converting enzyme (Rce1p) is a membrane-associated endoprotease of undefined mechanism that is involved in post-translational modification of the Ras GTPases and other isoprenylated proteins. Its role in Ras biosynthesis marks Rce1p as an anti-cancer target. By assessing the chemical accessibility of cysteine residues occurring naturally or substituted throughout the yeast Rce1p sequence, evidence is presented that Rce1p has eight inaccessible regions. Our evidence indicates that the natural cysteine residues of Rce1p lie within several of these inaccessible regions. Furthermore, we report that the natural cysteine residues are fully dispensable for enzyme activity, formally eliminating a previously proposed cysteine-based enzymatic mechanism for Rce1p. Our findings are most consistent with Rce1p having a single transmembrane domain near the NH2-terminus and seven additional segments that are either monotopic or tightly folded domains. At least one monotopic domain is expected based on the observation that Rce1p lacking the NH2-terminal transmembrane segment remains tightly membrane associated. The topological arrangement that we propose places the NH2-terminus within the endoplasmic reticulum (ER) lumen and all remaining segments on the cytosolic side of the ER, possibly within the cytosolic leaflet of the ER membrane itself. This arrangement allows for relative proximity of the three residues that are essential for yeast Rce1p function (E156, H194 and H248), consistent with their proposed role in forming an active site that lies at or within the cytosolic face of the ER membrane bilayer.

The Ordinance of 1669 in Application on the Grande Maîtrise de Toulouse as Documented by Louis de Froidour
Sara De La Torre Berón, Foundation Fellow
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Louis de Froidour was a forest surveyor appointed by Jean Baptiste Colbert during the reign of Louis XIV in 17th century France. Froidour was commissioned to document and represent the tracts of land owned by the inhabitants of the grande maîtrise de Toulouse, encompassing the southwest region of France. During his acclaimed tenure as surveyor, Froidour earned the title of France's "Grand Master of Waters and Forests." Using Froidour's personal records, archived in the Archives départementales de la Haute-Garonne and the Bibliothèque d'étude et du patrimoine de Périgord in Toulouse, as well as secondary literature, I evaluated the state of the land in the region Froidour surveyed before the implementation of the Ordinance of 1669. Using this information, I evaluated the lack of uniform land management policies across the grande maîtrise de Toulouse and particularly in the Pyrenees Mountains. The so-called "disrepair" in the land provided an impetus for comprehensive forest reform for the region Froidour surveyed, as well the entire kingdom. Finally, I also evaluated Froidour's methods of documentation and his personal impact on the surveying of land during his tenure, as well as his influence on later surveyors. This research contributes to the knowledge of land management practices in the area where Froidour conducted his surveys as well as the influence of economic governance on how local farmers determined the use of their lands.

The Relationship between Communication and Satisfaction with Change Management with Supervisor Trust as a Moderator

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Every organization will experience change in one form or another, and it is how that change is managed that can facilitate successful employee attitudes regarding that change. Studies show communication and trust with one's superior are vital factors in employees' satisfaction towards change. We expect to find that supervisor communication strength will be positively related to employee satisfaction with organizational change. We also predict supervisor trust will moderate the relationship between supervisor communication strength and employee satisfaction with change management in that when trust is high the relationship will be stronger, but when trust is low, the relationship will be weaker. The data was gathered through self-reported surveys from a large Fortune 50 company. After analyzing the data using ordinary least squares regression techniques in SPSS, we found evidence that supervisor communication strength was positively related with employee satisfaction of change management. Additionally, we found support for supervisor trust moderating satisfaction with change management; however, the relationship was in the opposite direction from what we had predicted. Our results indicated that when supervisor trust was high, the relationship between supervisor communication strength and employee satisfaction with change was low. When trust is low, we found the relationship to be weaker. Our data shows that communication and supervisor trust impact how employees feel about change management. These findings can be utilized by organizations to facilitate change more effectively. This will contribute to the satisfaction of employees with organizational change and their company as a whole, ultimately resulting in greater organizational success.

Effects of Electrical Stimulation Intensity on the Non-invasive Evaluation of Mitochondrial Function Using Near-infrared Spectroscopy

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Near infrared spectroscopy (NIRS) can be used to measure muscle oxygen consumption (mVO2). Repeated arterial occlusions after exercise provide an index of skeletal muscle mitochondrial function. The purpose of this study was to examine the effects of electrical stimulation (ES) intensity (i.e. current amplitude) on mVO2 and the recovery rate of mVO2 after exercise. Ten healthy subjects (age = 21.2 ± 1.4 years) were tested at three levels of ES current. Twitch ES (4 Hz) of the medial gastrocnemius/soleus muscles was used to increase mVO2. Repeated measures of mVO2 were fit to a monoexponential curve and rate constants were calculated. A force transducer was used to measure the time-tension integral (TTI) of ES exercises. Average currents used in this study were 45 ± 11, 61 ± 12, and 82 ± 14 mA for the low, medium, and high currents. Normalized TTI for low, medium, and high current trials were 54 ± 11, 82 ± 7, and 100 ± 0 % ($p < 0.001$). The initial (end-exercise) mVO2 were 2.56 ± 1.44, 3.64 ± 0.85, and 3.79 ± 0.60 %sec-1 for low, medium, and high current trials. NIRS rate constants were not different between trials (2.02 ± 0.54, 1.95 ± 0.44, 2.02 ± 0.46 min-1 for low, medium, and high current trials; $F(2,9) = 0.264$, $p = 0.771$, $\eta 2 = 0.028$). In summary, changes in ES intensity influence measurements of mVO2, but the recovery of mVO2 represents only the activated tissue and was independent of the ES intensity.

Abstracts

Analyzing Linkages between Economic Development Models and Food Security: Comparative Case Study of Thailand, Vietnam, and the Philippines

Colin Dungu
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This study seeks to answer the following question: What are the linkages between a country's development model and its food security? To answer that question, I compare the relationship between economic reforms and food security levels for Thailand, Vietnam, and the Philippines. This thesis emphasizes the economic rationale of liberalizing economic reforms and examines the reasons why those countries that adopt market reforms attract more foreign investment, which is the key to overall economic growth, and consequently food security. This study first investigates what is food security, and what are the causes of food insecurity. It then examines the economic models pursued by three Southeast Asian states that are relatively similar in population and size. Thailand and Vietnam have spearheaded forward in their goal towards attaining food security, whereas the Philippines remains a chronic importer of rice, which is their staple crop. The adoption of liberalization, trade, and market reforms in the former two has infused foreign direct investment (FDI) into the agricultural sector and enhanced efficiency in production methods, which has helped improve food security. However, by maintaining its reliance on the Import Substitution Industrialization (ISI) model for a significantly longer time period, the Philippines fell further behind in its economic development and failed to attract outside investment, which lowered agricultural production and increased food insecurity.

Text Messaging: A Tool to Increase Physical Activity Compliance?

Alexandra Ely
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Compliance of subjects is a key issue faced when implementing exercise programs. No universal recipe for success exists when it comes to increasing subjects' compliance to a physical activity intervention. Research has shown that increased levels of self-efficacy, social support, and knowledge about the benefits of exercise lead to greater compliance to an exercise program. The purpose of this study is to use accelerometry to analyze women's compliance to a walking program on weeks they receive motivational text messages as compared to compliance on weeks the texts are not sent. Participants, women ages 25-45, comprise three groups of six. During weeks three, five, and seven of the eight week intervention, each woman in a respective group receives a text on Tuesday, Thursday, and Saturday. These texts fall into one of three categories: self-efficacy, social support, or increasing knowledge. Every group is assigned a different category during each "text week," and during those weeks receives messages exclusive to that category. Post-intervention, total minutes walked during weeks when texts were received will be compared to those walked during weeks no texts were received. Differences between walking totals comparing texts from the three categories will also be examined. The impact of motivational text messages on program compliance will be analyzed to determine if text messaging is an effective tool to increase physical activity participation, as well as whether certain types of messages better increase participation. Results will have implications for the effectiveness of increasing physical activity compliance by use of motivational text messages.

Abstracts

Comparison of an Embedded Effort Measure on CNS Vital Signs between Older and Younger Adults

Sarah Evans
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Adequate effort displayed by participants and patients is an essential foundation for experimental and clinical testing. Clinicians and researchers need to be aware of potentially invalid results that may not accurately reflect optimal levels of effort from subjects. The objective of this study was to compare effort between younger and older adults within the CNS Vital Signs test, a neurocognitive computerized test battery. An embedded effort measure for a variety of clinical domains was compared across old and young participants. This indicator was determined by comparing each participant's performance to cutoff scores on multiple tests. It was hypothesized that a higher percentage of older adults would demonstrate adequate effort compared to younger adults. Examining effort in both populations is much needed given the sparse literature examining effort performance on this test. Additionally, due to the widespread tendency of college students to be used in university studies, research highlighting their degree of effort will play a critical role in determining the credibility of their results and the impact of motivation on performance. The results will serve as an indicator of the differences in effort between age groups as a further step in achieving the goal that data being used to make conclusions or diagnoses is both appropriate and dependable.

Managers vs. Employees: The Differing Effects of Communication Strength and Supervisor Support on Work Engagement

Meghan Foley, Katryna McCann
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

Employee engagement can predict critical outcomes for the bottom line of business operations; organizations want employees to feel engaged and therefore be motivated to produce significant results. Research has focused on employee engagement, but significantly less research has examined managerial engagement. The purpose of the present study is to test whether or not managers and employees derive their sense of engagement in the same manner, which could ultimately lead to ways in which businesses can most effectively build an engaged workforce of both entities. We defined engagement as our dependent variable, and used leader-member exchange to predict the positive effects of communication strength. The nature of the social exchange relationship between supervisor and employee also led us to predict a mediating role of supervisor support on communication and engagement. Using data from a Fortune 50 company, we tested the effects of communication strength and the mediation of supervisor support on engagement for samples of lower level employees and managers. Results showed that for both employees and managers, communication strength had a significant impact on their feelings of engagement. However, when testing for mediation, supervisor support was not a mediator for employees but was a significant partial mediator for managers' engagement. These results imply that there may be differences in the way employees and managers become motivated and engaged in their work roles, and points to the need for more research on how to best engage managers.

Identification of GABA-responsive Neurons in the Zebrafish Brain

Hope Foskey, CURO Summer Fellow
Dr. James Lauderdale, Cellular Biology, Franklin College of Arts & Sciences

Over 2 million people in the United States have experienced unprovoked seizure activity or been diagnosed with epilepsy. While medication has been developed that can help some people control their seizures, the mechanism by which seizures occur is not well understood, and the neural circuits by which seizure activity is propagated are unknown. The purpose of my experiments was to identify the neurons likely to be involved in generating seizure activity by using zebrafish (*Danio rerio*), an emerging vertebrate model in the study of seizure disorders. To do this, an adult zebrafish brain was cryosectioned transversely, and GABA-responsive neurons were identified by immunolabeling for GAD65/67, GABA, and GABAAR. GAD is the enzyme that catalyzes the decarboxylation of glutamate to GABA, a major inhibitory neurotransmitter in the brain. These experiments identified for the first time the neural pathways in the zebrafish brain that are affected by seizure activity and provided insight into the pathways that normally are affected in human seizures.

A Testosterone Tale: Do Females Really Have Higher Levels Than Males?

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

Testosterone is the principal male sex hormone in mammals. Males typically have testosterone levels 2-7 times higher than females, and testosterone affects reproductive behavior and aggression. Recent studies in hyenas and hyrax suggest that in some mammals, females can show testosterone levels equivalent to males, with important consequences for female behavior. Data from a long-term study on Grant's gazelle (*Nanger granti*) in Kenya showed that testosterone levels of some females reached concentrations 10-fold greater than male concentrations. Variation in female testosterone was associated with reproductive status and aggression. Since this study quantified testosterone levels from fecal samples, and sex differences in fecal metabolite concentrations may not reflect actual differences in circulating testosterone, our objective was to investigate whether fecal testosterone differences reflect true differences in circulating testosterone between male and female gazelle. First, we tested whether serum concentrations showed the same differences between sexes as fecal concentrations. We found that the female fecal average was 2 times higher than the male average, but the male serum average was 3 times higher than the female average. Next, we collaborated with the UGA Complex Carbohydrate Research Center to isolate specific testosterone-like metabolites present in fecal samples that may explain the differences between the fecal and serum samples. We will test the metabolites for binding to the testosterone ELISA assay. This study will improve current understanding of biochemical controls on behavior.

Water Loss Rates of Two Terrestrial Salamanders, *Plethodon shermani* and *Plethodon teyahalee*, and Their Hybrids

Samantha Frigerio, Elijah White
Dr. Jeff Hepinstall-Cymerman, Warnell School of Forestry & Natural Resources

In the Southern Appalachian Mountains, two salamander species, *Plethodon teyahalee* and *Plethodon shermani*, hybridize across an elevational gradient. Studies show the upper bounds of this hybrid zone are expanding. We hypothesized that this upward movement is affected by differing water loss rates between species which, in turn, may affect their responses to climate change; specifically that *P. teyahalee*—located at lower elevations—has lower water loss rates than *P. shermani*—

located at higher elevations. We conducted a reciprocal transplant field experiment in which salamander water loss was measured in natural environmental conditions. Using linear mixed-effects models, we found that an interaction between body size and hybrid level most accurately predicted salamander water loss. A lab experiment was also conducted in which we measured water loss of individuals from the ends of the hybrid zone under controlled conditions. Using a repeated-measures ANOVA, we found a significant difference in water loss rates between the two species ($F_{30,930} = 2.325$, $P < 0.001$). Water loss is likely one factor contributing to the hybrid zone's upward movement. Future studies may determine how water loss affects behavior and project future zone dynamics in the context of climate change.

Landscapes of the Interior: Ethnobotany and Sense of Place among Karen Refugees
Terese Gagnon, CURO Summer Fellow
Dr. Virginia Nazarea, Anthropology, Franklin College of Arts & Sciences

Forced by ongoing government persecution to leave their homeland in Burma, Karen refugees residing in Georgia continue each day the process of remembering and reaffirming their cultural traditions while seeking meaning and belonging in their new environment. Through engaging in interviews and gardening practices with the Karen people this project examines the anthropological phenomenon of the 'landscape of the interior,' particularly as experienced from a transnational perspective. Recognizing the value of preserving genetic biodiversity alongside culturally situated knowledge, it aims to record—through the process of memory banking—ethnobotanical traditions of the Karen and their cultural relationship to the natural environment. One important product of this research is a compendium of plant species grown by Karen gardeners in Georgia. This compendium includes plant characteristics, methods of cultivation, uses, religious/cultural significance and photo documentation. Additionally, this project explores the role of 'interior landscapes' in shaping relationships with a new inhabited environment. This investigation seeks to benefit the Karen people and the community at large by encouraging the continuation of traditions — creating senses of 'rootedness' and preserving ethnobotanical knowledge and biodiversity. This research is approached with the belief that practices of remembrance and resilience are often the strongest means of combating forces of hegemony and oppression.

On Memory's Tidewater: Sapelo Island Documentary Project
Terese Gagnon, CURO Summer Fellow
Dr. Virginia Nazarea, Anthropology, Franklin College of Arts & Sciences

The Geechee Gullah people, descendents of enslaved individuals brought from the western coast of Africa, have inhabited Sapelo Island, Georgia for four centuries. Through closely knit community and a strong sense of place, their culture has maintained a distinct life way that includes knowledge and practices passed down from their African forbearers. Local traditions include unique forms of art, music, agricultural practice and the Gullah language. Though there were once many such communities, today the Hog Hammock community is the last intact Geechee Gullah community on Sapelo, and one of the last surviving in the world. The residents of Hog Hammock have clung to their deeply storied land for generations, despite numerous adversities. However, a drastic tax imposition now threatens to push them from their island home, potentially fracturing their community once and for all. Drawing on both anthropological and journalistic perspectives, this documentary aims to capture a glimpse of the history and feel of the Hog Hammock community, while exploring the ramifications of the recent tax legislation. It draws on interviews with Hog Hammock residents,

research on the history of the Island, discussions with prominent local figures, and footage of the Island community. Ultimately this cross-disciplinary project seeks to call us to our senses, appealing to our sense of beauty as well as our sense of injustice, hoping to stir within us the waters of place and memory.

Access Care

Smitha Ganeshan, Foundation Fellow
Dr. Monica Gaughan, Health Policy & Management, College of Public Health

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

"Pretty What?"— An Exploration of Society and Gender through Movement

Allison Gantz
Prof. Rebecca Enghauser, Dance, Franklin College of Arts & Sciences

"Pretty What?" is a choreographic work created to question societal norms. Specifically focusing on gender roles and beauty, this dance explores the heightened expectations present in our American culture. Representation is the central idea, and the tension between people's definitions of image and media-defined beauty are the resulting concepts. The intention was to begin the piece with the accepted, stereotypical images of men and women in society. Leaning towards nostalgia, I presented the highly stereotypical figures of glowing, elegant women and strong, domineering men. Then, a film of compiled images of women in magazine photographs and advertisements played to demonstrate the relevance of this work in the current society. After setting up a dichotomy of men and women, pretty and not so pretty, I blended the two definitions together through movement. The awkward deconstruction of gender and sexuality was the result. Research of advertisements and movement generated through conversation with the cast of my dance helped me create unexpected movement combinations and relationships. As a culmination of my research on image identity, I ended the dance in the middle, between hyper-sexualized gender extremes and irreverent gender role reversal. The idea of middle ground leaves someone being completely honest with who he or she is. How do people feel when they are alone with their thoughts? How do people

feel about their personal beauty and personal worth? I left the piece open ended in hopes that a viewer could consider these questions for him or herself, and question the magnitude of influence the media has on creating accepted roles in society.

The Death of the Death Penalty
Richard Gardiner
Dr. James Monogan III, Political Science, School of Public & International Affairs

The death penalty is a major topic in the realm of criminal justice policy. Past research has clearly shown that the death penalty is in decline across the nation. This paper researches why states differ in their capital punishment policies. I, however, propose that there are multiple factors all leading to the decline: the rise of the innocence frame, differing reactions due to error, economic feasibility, and changing public opinion. My research method is unique from other works in that I am studying public opinion at the state level combined with a coding system that assigns the level of restriction for each state's laws pertaining to the death penalty. I expect to find that public opinion is the single most important factor with economic factors being secondary. How death penalty policy is made in the U.S. depends on what the states are doing. Also, this study can be used in other areas of public policy to help examine future debates empirically. Because there is no actual contact with individuals and those defined as vulnerable, there are not any ethical implications hindering my study.

Compensatory Exercise and Thinness Expectancies
Ashton Garner
Dr. Sarah Fischer Nowaczyk, Psychology, Franklin College of Arts & Sciences

Women with eating pathology tend to report higher weight and shape concerns and more frequently list shape and weight as motivation for exercise than healthy women. Compensatory exercise (exercise performed in an effort to control weight/shape or in response to caloric intake) is considered a maintenance factor in eating disorders. Thinness expectancies (beliefs that thinness will improve the overall quality of life) are also strongly linked to eating disorder symptoms. There is little literature, however, examining the relationship between compensatory exercise and thinness expectancies. The present study was designed to examine the predictive relationship between thinness expectancies and endorsement of compensatory exercise using the TREI, EDE-Q, and exercise Timeline Followback calendars. Additionally, the study examined the specific types of exercise (e.g., walking, running, elliptical, etc.) that individuals who report compensatory exercise choose. Our data was obtained through self-report questionnaires completed by a sample of undergraduate women at a large southeastern university. Logistic regression will be used to identify participants as compensatory exercisers based on their endorsement of thinness expectancies. Additionally, in the sample of women who endorse compensatory exercise, we expect to find a significant positive correlation between the frequency of compensatory exercise and level of thinness expectancies. We further expect to find individuals who report higher thinness expectancies to engage in high-intensity cardiovascular exercises such as running. These findings will be a valuable addition to the current literature concerning factors of eating pathology and will have implications for both treatment and prevention programs.

Teacher Cheating Scandals in Georgia and Possible Policy Solutions
Eilidh Geddes, Foundation Fellow
Dr. Sylvia Hutchinson, Emeriti Scholar, College of Education

A major problem facing Georgia's education system is teacher manipulation of test score data, which was brought to the forefront of

public attention by the recent Atlanta Public Schools cheating scandal. Cheating scandals hurt the educational outcomes for children and erode the credibility of our schools. Current incentives align to push teachers towards cheating, and current testing practices make it possible for this cheating to occur. Possible policy solutions to address this issue include using an algorithm to better detect cheating, having outside monitors administer tests, changing legislation that creates bad incentives, and implementing a comprehensive testing policy. These four alternatives were evaluated based on their ability to reduce teacher cheating, improve educational outcomes, and be passed and implemented successfully. Of these four alternatives, a comprehensive testing policy would best meet these policy goals. This alternative would involve use of an algorithm to better detect teacher cheating, would provide guidelines for improved testing security, would mandate investigations by the state, and would increase legal education for teachers over the consequences of cheating.

Assessing the Role of Soluble TNF Receptors I and II in Placental Malaria

Mina Ghobrial
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Malaria is an infectious disease from the parasite genus *Plasmodium,* which kills approximately 2.7 million people each year. *Plasmodium falciparum* causes a vast amount of malarial infections. Where *Plasmodium falciparum* is present, malarial infections in pregnant women is correlated with both maternal and neonatal morbidity, low birth weight, and a reduced chance that the offspring will survive their first year. In placental malaria, infected erythrocytes (IEs) gather in the intervillous space of the placenta. Sequestration of IEs in the intervillous space leads to changes in cytokine balance, namely an increase in TNF- α (Tumor Necrosis Factor). Low levels of TNF- α result in an enhancement of phagocytic activity, which works to control parasite densities; high levels can inhibit endocrine function and initiate extracellular matrix degradation, resulting in poor pregnancy outcomes. Activity of TNF- α can be modulated by its soluble receptors, soluble TNF receptors I and II. Understanding the role of soluble TNF receptors I and II can help to accurately diagnose placental malaria, be predictive of negative outcomes, and assess the role of oxidative stress in disease and role of Caspase 3 (CASP 3) for apoptosis. In these experiments, approximately three groups of mice are used: infected not pregrant (INP), infected pregnant (IP) and uninfected pregnant (UP). INP and UP mice are controls for parasitemia and weight, respectively. Furthermore, these mice are genetically modified to express 1) both TNF receptors I and II, 2) neither of the receptors, or 3) only one (soluble TNF receptor I or II). Approximately 15 mice are used per experiment. On gestation days 0 and 6-14, clinicals are performed on these mice. Clinicals include examining weight, hematocrit and parasitemia. Trends in these categories are then evaluated. On gestation day 14, mice are euthanized, and their placental tissue is further assessed. Placental tissues are analyzed using immunostaining for CASP 3, a protein associated with apoptotic cells. The expectation is that mice lacking soluble TNF receptors I or II will have less expression of CASP 3. Immunohistochemistry is used to further analyze mouse tissues. Additional examinations are considered to evaluate the role of oxidative stress in TNF knockout mice versus wild type. Understanding the role of soluble TNF receptors I and II has a plethora of benefits, ultimately leading to better understanding pathogenesis of placental malaria and being able to predict and control its associated outcomes.

Science Lecture Classrooms: Extending the Bounds of Creative Teaching and Learning

Olivia Gorbatkin
Prof. Tracie Costantino, Lamar Dodd School of Art, Franklin College of Arts & Sciences

How do we enhance the learning of science students in large lecture classrooms? Based on research of synergistic learning and creativity, students can benefit significantly in their ability to problem solve by increasing their creative thinking due to various pedagogical styles and curricular innovations. In this study science students at the University of Georgia will be surveyed about the most effective and ineffective teaching strategies in primarily lecture classes. I will also explore tactics in non-science classes that could be incorporated into large lecture classes, all for the purpose of enhancing the engagement of students with their professors and course material. I will additionally review existing research on synergistic learning, pedagogy, and attention span. Permission will be sought from the UGA Institutional Review Board before data collection will commence.

Cell Cycle Gating of the Mammalian Sonic Hedgehog Signaling Pathway

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The Sonic Hedgehog (SHH) signaling pathway regulates cell fate specification, differentiation and growth within the tissues such as the central nervous system during metazoan development. While the regulation of cell cycle progression by SHH signaling has been extensively studied, it remains unclear whether the cell cycle controls response to SHH signals such that individual phases can be conducive or refractory for signaling. One reason to suspect this is the fact that primary cilia are required for SHH signaling in mammals, yet in cultured cells the primary cilium is present only in G1 (or G0) phases. A method in our lab was devised to assay the unspliced (intron-containing) mRNA signal of targets induced by a SHH pathway agonist to provide a real-time assay for pathway activity. Using this method, we analyzed the cell's response to the SHH agonist under different culture conditions and measured the half-life of the unspliced messages. The real-time responses will be determined with respect to each phase of the cell cycle, and data will be compared to the ciliogenesis profile in each cell cycle phase. These experiments will test the hypothesis that progression though the cell cycle gates Hedgehog pathway activity and that assembly and disassembly of the primary cilium may be responsible.

Examination of the Link between Glycosaminoglycans and Pectins

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Glycosaminoglycans (GAGs) are polyanionic macromolecules localized in the extracellular matrix with roles in structures and cell function. Chondroitins, a class of GAGs, may also serve as biomarkers for disease diagnosis and progression (Rye et al., 2002). Furthermore, the application of chondroitins, and thus chondroitin degrading enzymes, extends to proliferation, cell communication, wound healing, tissue growth, and angiogenesis in abolishing tumors (Fikri et al., 2007). The corresponding plant matrix polysaccharides are the pectin polysaccharides, partially esterified macromolecular polygalacturonic acids (Gemeiner, 2012). Glycosaminoglycans and pectins provide, in separate species, similar functions. The similarity between the functions of pectins and GAGs suggests possible insights into the mechanism by which pectins impact human health. The three dimensional structures between bacterial enzymes which degrade chondroitins and fungal pectin degrading enzymes (PDEs)

show striking similarity. Pectin degrading enzymes could alter cell processes moderated by GAGs, opening up utilization of these molecules in treatment of conditions such as spinal cord injury, where improper deposition of chondroitins leads to inhibition of axon growth. Previous studies in our lab revealed that pectins are able to alter the glycosidic activity GAG degrading enzymes and conversely chondroitins are able to bind PDEs and alter their activity. The thermodynamics of binding of pectins to chondroitinases and chondroitins to PDEs is required to validate the appropriateness of these interactions *in vivo*. Such data is obtained using Surface Plasmon Resonance (SPR). We will present the results of our SPR studies of combinations of the pectins, chondroitins, PDEs, and chondroitinases.

Reliability and Validity Study of an Accelerometer-based Approach to Estimate Free-living Energy Expenditure

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Actigraph accelerometers track acceleration in three planes of movement, which provides an objective measure of exercise intensity during physical activity. Accelerometer data can be paired with an individual's oxygen consumption (VO_2) during exercise to generate a personalized prediction equation for energy expenditure (EE) at varying exercise intensities. The purpose of this research study is to evaluate the reliability and validity of free-living, EE estimates derived from individually calibrated accelerometers. Participants completed a walking bout of exercise at sub-maximal speeds, while wearing two accelerometers, on two different days. Participants also had their VO_2 recorded on both days using a COSMED $K4b^2$ (portable metabolic unit) to generate personalized EE prediction equations. Participants then completed bouts of brisk walking, outside the laboratory setting, with an accelerometer and a COSMED unit. Reliability of the accelerometer-based EE prediction equations was evaluated by comparing the prediction equations formulated on separate days. To test the validity of accelerometer estimates of EE, accelerometer predicted values of EE were compared to accepted COSMED measures of EE. If personalized EE prediction equations, formulated using accelerometers, prove to accurately reflect EE during free-living exercise, then accelerometers may be used to evaluate EE in a multitude of energy balance studies.

Anoxic Transition within the Smoky Hill Chalk Member of the Niobrara Formation and Its Effect on Organic and Inorganic C-N Assemblages

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World fossil fuel supplies continue to be constricted by the ever-increasing need for energy. Traditionally, this energy has been supplied by conventional oil deposits, but geoscientists are now searching for less conventional hydrocarbon deposits to satisfy global demand. Understanding the provenance and depositional history of the organic material in these deposits can greatly benefit exploration and recovery. Oceanic Anoxic Events (OAEs) may influence the quality and type of organic/inorganic sediments deposited. OAEs are interpreted as rapid, global depositions and concentrations of organic-rich marine facies. The Smoky Hill Chalk Member of the Niobrara Formation was deposited in the Western Interior Seaway during the Cretaceous (Coniacian–Santonian), which has been hypothesized as an OAE event. X-ray diffraction (XRD) and stable Carbon (C) and Nitrogen (N) isotopes were used to determine the concentrations of C and N in the inorganic/organic pools. Carbon pools identified include carbonates and organic matter (OM) with sub-pools of C-OM located as particulates and in interlayer sites of

the expandable part of mixed layered clay minerals (i.e., smectite). Nitrogen pools identified include N-OM particulate, N-fixed in clay minerals, and N-OM in interlayer sites of smectite. The mineralogical and isotopic data support oxic to anoxic conditions progressed upsection. An increase in the total percent carbon and nitrogen available within the organic assemblages was found, including an increase in lamination and inclusions of sulfide minerals. Understanding the accumulations of organic material and the progression of anoxia can assist scientists to pursue similar formations in the exploitation of unconventional hydrocarbon deposits.

Epigenetic Pathways and Glutamate Transporters in Neuropathic Pain

Hannah Harrison
Dr. Han-rong Weng, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The mechanisms underlying neuropathic pain are not well understood. This presents difficulties for the development of an effective treatment. It is known that the major excitatory neurotransmitter glutamate holds a significant role in the development of neuropathic pain. There are many glutamate transporters that reuptake glutamate into the neuron and astrocytes from the synapse. One of such transporters that participate in neuropathic pain is the glutamate transporter amino acid transporter-1 (GLT-1). Additional molecular epigenetic pathways are known to be involved in neuropathy, particularly those of the pro-inflammatory cytokines interleukin-1β, TNfα, and interleukin 6. The purpose of this research is to investigate how epigenetic mechanisms are involved in the interaction of the cytokines and GLT-1. If neuropathic pain is created and sustained, then epigenetic mechanisms are involved in the maintenance of the neuropathy. In order to examine possible epigenetic mechanisms a partial sciatic nerve ligation (pSNL) neuropathic pain model was first developed using male Sprague-Dawley rats. Behavior tests were conducted to verify pain development in the model. The lumbar 4-5 spinal dorsal horn tissue from these animal models was then collected via laminectomy surgery for histone methylation analysis. Methylation modification mark at the histone H3-K27 is involved in cell proliferation and differentiation of glial cells. The results of this study demonstrated hypermethylation in the pSNL animal models. This evidence leads to the conclusion that epigenetic pathways are involved in the maintenance of neuropathic pain. The hypermethylation result suggests a possibility of more progenitor cell proliferation and less differentiated cells occurring at the molecular level of neuropathic pain.

Target Training: Is It an Effective Method for Enriching the Lives of Captive Capuchin Monkeys?

Amanda Heaton, Amy Cohen
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

We set out to evaluate "Target Training" for immediate food reinforcement as a form of enrichment to promote psychological wellbeing for five captive capuchin monkeys. The activity allows researchers to attract monkeys to a specific area, permitting, for example, modification of the cage or examination of the monkeys. Support for psychological wellbeing may result from positive interaction with humans and the learning challenge that the activity offers. Four of the five monkeys are housed in pairs; the fifth is housed individually. In each pair, one monkey is dominant, as evidenced by displacement of the other and unfettered access to offered resources. In training, the monkeys were reinforced for holding a plastic ball bolted to the end of a stick for an arbitrary length of time. Two to three days a week from November 14, 2012 to February 4, 2013, the subjects performed three trials of 5, 10, and 15 seconds each (9 trials total). All the monkeys mastered the task quickly, suggesting

that the task is not particularly demanding cognitively or motorically. Unexpectedly, subordinate monkeys had high rates of failure after mastery due to distraction and interference by the dominant monkey. We conclude that effective enrichment strategies cannot promote direct competition between pairmates in confined spaces. Target training fails on this measure, although it retains practical value for management. Offering challenging, attractive activities simultaneously to both monkeys may have better enrichment outcomes.

The Role of Lipid Fluidity in the Assembly of Trypanosome Lytic Factor

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Trypanosome Lytic Factor (TLF) is a minor subspecies (< 1 %) of high-density lipoproteins (HDL) that protects higher primates from the majority of African trypanosomes and contains haptoglobin-related protein (Hpr) and apolipoprotein L-1 (apoL-1). Although Hpr and apoL-1 assemble into the same HDL particle, no protein-protein interaction between the two has been reported. Here we have investigated a potential mechanism of HDL sub-speciation, and we propose that lipid fluidity plays a significant role in the assembly of TLF. It has been shown that the lipid component of HDL is sufficient for Hpr binding and that higher lipid fluidity confers faster association kinetics of Hpr. Utilizing a model liposome system and dye release assays, we show that apoL-1, like Hpr, interacts more rapidly with liposomes composed of phosphatidylcholines with short or unsaturated acyl chains. Additionally, we report that the incorporation of both cholesterol and ergosterol reduces the rate of apoL-1 interaction with lipid membranes. To study how apoL-1 affects the fluidity of the model liposomes, we utilized anisotropic dyes corresponding to different lipid bilayer regions. We show that apoL-1 decreases the rigidity of the interfacial region of the phospholipids and hypothesize that this prepares the HDL for interaction with Hpr. Our results suggest a potential mechanism of HDL assembly and sub-speciation that relies on sensitivity to lipid fluidity rather than protein-protein interactions. Understanding this mechanism not only impacts TLF-mediated killing of trypanosomes, but also cardiovascular disease and metabolic syndrome, in which the level and composition of HDLs is affected.

How the White Protestant Church Should Respond to Issues Affecting Lesbian, Gay, Bisexual, and Transgender People

Charles Hicks, CURO Graduation Distinction
Prof. Cynthia Tucker, College of Journalism & Mass Communication

The white Protestant church should expand upon Jim Wallis's notion that religion is "personal, but never private" to resolve its multiple positions on issues affecting lesbian, gay, bisexual, and transgender people. In my thesis, I discuss how the white Protestant church in the United States has shied away from public life since the Scopes Monkey Trial of 1925 and stopped offering institutional responses to public issues, as it did with the Prohibition movement and for women's liberation in the early 20th century. However, there has been a recent occurrence of a white Protestant-driven institutional response to the public issue of human trafficking via the End It Movement, which echoes Wallis's notion that a person's personal faith should affect his or her response to public life. The white Protestant church could use the End It Movement as a model for addressing the church's muddled stance on other social issues, including those affecting LGBT people, without compromising denominationally determined theology about LGBT issues. It is important for the church to address issues affecting LGBT people, because one-third of U.S.

Americans in 2010, according to the Public Religion Research Institute, said the messages from religious bodies are contributing "a lot" to higher suicide rates among lesbian and gay youth. Another third, according to the same study, said these messages contribute "a little."

Development of an Immunohistochemical Technique to Detect *Burkholderia mallei* in Horse Tissues

Yun Ho
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Burkholderia mallei is a gram negative organism that is responsible for the disease glanders in horses. Infection can result in the formation of lesions in the lungs, ulcers in the mucosal membrane of the upper respiratory tract, skin lesions, and lymphangitis. *B. mallei* can also be transmitted to humans, resulting in pneumonia and skin lesions. This bacterium is difficult to visualize in tissue lesions even with the help of histochemical stains. Therefore, the goal of this research was to develop an immunohistochemical technique to facilitate identification of the organism in formalin fixed tissues from experimentally infected horses to study *B. mallei* pathogenesis. In developing this technique, we initially used tissue from mice infected with *B. mallei*, a variety of antigen retrieval methods, serum from both mouse and horse infected with *B. mallei* as the primary antibody at various dilutions, and a variety of detection systems. Once standardized for mouse tissues, we converted and optimized the technique for use in horse tissues. Our optimized protocol includes proteinase K as the antigen retrieval agent, mouse *B. mallei* antiserum at a 1:850 dilution, a commercial polymer detection system linked to horse radish peroxidase (Mach 3; Biocare), and DAB as the chromagen. This technique has allowed us to visualize bacteria in lesions within epithelium and extracellularly in exudate in tissues of experimentally infected horses. This technique will help us track the bacterium and better understand lesion development in glanders.

Top-down Control by Bonnethead Sharks in Oyster Reef Communities through Consumptive and Non-consumptive Effects

Zachary Holmes
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The eastern oysters (*Crassostrea virginica)* along the Atlantic coast are an important foundational species upon which many estuarine species are dependent for food and structure. Bonnethead sharks (*Sphyrna tiburo*) are the most abundant fish by biomass within some southeastern estuaries and likely play a vital role in maintaining healthy reef ecosystems. Our focus was to determine how bonnetheads exhibit top-down trophic control in oyster reefs through consumptive and non-consumptive effects. Bonnetheads are known to be voracious predators of blue crabs (*Callinectes spp.*) and therefore contribute greatly to estuarine trophic dynamics. In order to illuminate the methods by which bonnethead sharks control trophic dynamics, we conducted a replicated mesocosm experiment to examine how bonnethead sharks influence crab mortality and foraging behavior and how these effects on the crabs trickled down to affect species lower on the food chain, especially juvenile oysters. Our mesocosm study showed that sharks significantly impact juvenile oyster survival by reducing blue crab abundance and foraging. Bonnetheads, however, had little effect on mud crab (*Panopeus herbstii*) predation of oysters, with substantial quantities of oysters eaten even in the presence of sharks. We also quantified predation rates of crabs in field settings both on and away from oyster reefs. Our results indicate that crab loss is extremely high away from oyster reefs, often approaching 100% in a 12 hour period. These results indicate that bonnethead presence in oyster reef communities is a significant driver of blue crab behavior, but may have little

trickle-down effect on juvenile oyster mortality.

Converting Culture: Relating 19th Century Women's Dress to a 1960s Society

Emily Hoskins, Dakota Nesbitt
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Historical clothing designs change when translated to a stage or film environment to help the audience engage with the show and allow the actors more freedom with character and movement. Freddy Wittop's costumes for *Hello, Dolly* employed brighter colors, lighter fabrics, and embellishment to minimize weight and maximize movement. Using Wittop's designs and the costume itself in the Hargrett Library, we explored how that costume won the Tony Award.
The 1900s is one of the most fascinating eras of women's clothing. It is defined by its complexity, working its way from corsetry and crinolines to shirtwaists and bustles. Yards of fabric were tailor-draped onto corset-bound figures to create a pleasing silhouette. Innovations allowed for printed fabrics, but overall the colors remained drab and unexciting, at least to an audience living in the 1960s. The 1960s formed a sharp contrast with the 1900s as it pertains to women's clothing. Bright colors and prints, short skirts, and shift dresses that hid curves were very popular. The problem remains: how do you take such conservative dress necessary for *Hello, Dolly*, set at the turn of the century, and re-work it for a late twentieth-century audience? You hire Freddy Wittop. As a dancer for most of his life, Wittop knew how clothing moved. His costume choices for the musical *Hello, Dolly* were easy to wear and gorgeous to behold. He used every color of the rainbow and toyed with shapes and embellishments to create the illusion of a corseted silhouette without the restrictions.

Affordable Housing in a Poverty-Stricken Community

Kirstie Hostetter, Foundation Fellow
Dr. Meghan Skira, Economics, Terry College of Business

Students attending the University of Georgia inflate local rental property rates, reducing the amount of affordable housing available to the 34.6% of the population living below the Federal Poverty Line in Athens-Clarke County. A literature review was conducted to evaluate mandatory and incentivized affordable housing programs as well as the status quo based on three main criteria: increased efficiency of existing housing options, improved low-income household stability, and political feasibility. The analysis revealed that Athens-Clarke County should offer incentives to property owners equal to the market rates of participating units in exchange for designation as affordable housing. This policy would utilize the 23,277 rental rooms currently vacant, provide stable mixed-income living environments, and be implemented through the use of the $1,272,476 in federal funding received by the county for programs addressing issues of human development. An incentives program provides a realistic, timely solution to the pressing issue of affordable housing. Property owners are justly compensated for participation in the program, receiving money for units that would otherwise provide no source of revenue considering the 19% rental vacancy rate. Lower-income families experience the many benefits associated with mixed-income housing, including better school performance and a home environment conducive to a healthy family and financial life. Both participating and surrounding properties are not affected by the stigmas attached to traditional, concentrated affordable housing structures.

Abstracts

Relationship between Approximate Entropy and Dynamic Postural Stability in Ankle Instability

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Chronic ankle instability (CAI) is a condition of repeated episodes of the ankle "giving way" that develops after repeated ankle sprains. Approximate entropy (ApEn) measures the randomness of biological signals, while dynamic postural stability indices (DPSI) measure the ability to maintain balance transitioning from a dynamic to static position. Seventy-nine participants (21.04 ± 2.4; mass 70.31±13.70; height 169.70±9.85) completed three 10-second single leg balance tests and three vertical jump landings onto a force platform. Ground reaction forces were collected and exported. DPSI composite scores were calculated for the dynamic trials while ApEn was calculated in the anterior-posterior and medial-lateral directions during static balance trials. ApEn was correlated with DPSI to determine if a curvilinear relationship existed. Pearson bivariate correlations were performed, and no correlations were significantly significant ($r = -0.009$-0.077, $p>0.05$). Static and dynamic balance appears to measure different constructs, and ApEn and DPSI also seem to measure different components of those constructs. ApEn as a non-linear measure does not vary with the linear DPSI. Dynamic stability and variability may influence CAI, and ApEn and DPSI measures should be considered separately when trying to measure balance ability.

The Prevalence of *Salmonella* Infection in Various Southeastern Wild Aquatic Turtles and Captive Painted Turtles (*Chrysemys picta*)

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There are very few studies of *Salmonella* infection in wild turtles. Although the prevalence of infection of aquatic turtles for the pet trade has been well established, the rate of *Salmonella* carriage by wild turtles is still largely unexplored. We had two objectives with this study: 1) to describe the prevalence of *Salmonella* infection of various species of Southeastern wild aquatic turtles; 2) to determine whether the infection status changes after placed in captivity and presumably stressful conditions. For the first objective, we sampled wild turtles. Using baited hoop traps, a total of 134 turtles were captured from seven sites in Athens-Clarke County, Georgia. Each turtle was kept in an individual, clean plastic container filled with roughly 1 cm water depth for approximately 12 hours until they defecated. Feces were collected with sterile disposable 1mL pipettes and immediately placed in 10 mL of dulcitol selenite broth media. The samples were submitted to Athens Diagnostic Laboratory within a 24-hour period from collection. Of the turtles previously captured, 21 were selected to investigate the second objective. They were housed individually in 10-gallon tanks at the Whitehall Herpetology Lab. Turtles were part of a concurrent study and underwent a minor surgical procedure during the first week, which is considered a stressful event. For a period of 45 days, weekly feces samples were collected from each captive turtle. In a second captive trial, 10 turtles were kept in the same conditions as the first captive trial. For this trial of 90 days, three feces samples were collected: one at the beginning, in the mid-period, and at the conclusion of the study. The feces were also submitted to

the Athens Diagnostic Laboratory for testing. The results of the studies are still pending.

In Vivo and _In Vitro_ Analyses of the Human Insulin-degrading Enzyme Reveal That the Yeast A-Factor Mating Pheromone Can Serve as a Universal Substrate for M16A Family Proteases

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Though the exact cause of Alzheimer's Disease (AD) is not fully understood, it is believed that its development is due to the accumulation of neurotoxic Aβ peptides. The M16A protease human insulin-degrading enzyme (hIDE) cleaves many small peptides, including Aβ. Thus, hIDE is of biomedical relevance because it is proposed to forestall the onset of AD by promoting clearance of these Aβ peptides. To better understand the function of hIDE, this study focuses on *in vivo* and *in vitro* analyses of hIDE. Using yeast as a genetically tractable model system, a yeast expression plasmid encoding hIDE was created and *in vivo* functional tests based on a-factor production were performed. Previously, it was determined that the roles of the yeast M16A proteases Axl1p and Ste23p in the production of the a-factor mating pheromone could be substituted by other non-yeast M16A proteases. It was expected and subsequently confirmed through a yeast mating test and an a-factor halo assay that hIDE can mediate a-factor production. Thus, it appears that a range of M16A proteases can be expressed and evaluated using the yeast system. This study was largely prompted by a recent *in vitro* study that demonstrated an inability of hIDE to recognize a synthetic substrate based on a-factor. The different outcomes of the *in vivo* and *in vitro* assays suggest that substrate differences underlie the differential outcomes. Nevertheless, our results demonstrate that hIDE can indeed recognize a-factor *in vivo* and supports that hIDE has enzymatic properties consistent with those of other M16A enzymes.

Resolving Species Relationships When Reproductive Barriers Are Incomplete: A Case Study in Drosophila

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Reproductive isolation is not an instantaneous process. Over time, geographic or ecological barriers can facilitate independent genetic changes such that populations may accumulate differences that prevent successful reproduction when they come back together. When populations have been separated for a long time, but are still reproductively compatible in the laboratory, we wonder whether they can be considered distinct species. Incomplete reproductive barriers correlate strongly with variable levels of genetic divergence, and understanding how many genetic differences are required for speciation is of key interest. Here, I use phylogenetic methods to reconstruct the evolutionary history of three closely related species with incomplete reproductive barriers: *Drosophila recens, Drosophila subquinaria,* and *Drosophila transversa*. I complement this with behavioral assays with classical genetic crosses to investigate how genetic divergence is associated with reproductive isolation. *Drosophila transversa* is found in Europe and Asia, whereas the other two species co-occur in North America. I find some genetic divergence between *D. subquinaria* and *D. transversa*, consistent with their strong geographical isolation, but I find no evidence of reproductive isolation between these species at either the premating or postmating levels. In contrast, I find that *D. recens* is strongly genetically distinguished from both *D. transversa* and *D. subquinaria*, and that unidirectional behavioral isolation as well as hybrid male sterility and cytoplasmic

incompatibility operate to keep these species separate.

Higher Education and Future Planning

Lindsay Ives
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Higher education allows individuals to specialize their knowledge in a specific area of study. But what happens after they obtain degrees? Past studies have shown that changes in the labor market have affected the young adult's ability to achieve self-sufficiency. It has also been previously shown that the roles of social support and optimism in adaptability are important in making this transition. The current study focuses on how different guides regarding a person's future can affect psychological well-being. Participants completed surveys measuring different psychological traits while in the presence of a degree checklist (laptop condition), a career plan and notebook with questions about the relationship between college and career (notebook condition), or a blank desk (control condition). Data indicated that participants in the Laptop and Notebook conditions viewed the world as more hostile. Those in the Notebook condition also exhibited a higher search for meaning in their lives and lower life satisfaction. These findings suggest that current approaches to planning life after college may have negative effects on students. Checklists and plans regarding life after college may cause students to adopt a negative worldview and experience discontentment. Recommendations for approaching this school to work transition are included in this article.

Targeting the *Mycobacterium smegmatis cobU* Gene to Study Vitamin B12 Biosynthesis

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Mycobacterium tuberculosis (*Mtb*), the causative agent of tuberculosis, latently infects 1/3 of the human population and kills approximately 1.4 million people annually. The success of *Mtb* relies on its ability to obtain and utilize nutrients from the host. Vitamin B12 (B12) is a cofactor of various metabolic enzymes. *Mtb* appears to have a complete set of B12 biosynthetic genes. When assayed using a *Salmonella typhimurium* auxotroph, B12 is not made under standard culture conditions by *Mtb*, but is made by the nonpathogenic soil saprophyte *Mycobacterium smegmatis*. This might be due to tightly-regulated B12 biosynthesis in *Mtb* or perhaps *Mtb* produces a form of B12 that cannot be utilized by the salmonella auxotroph. My project investigates B12 synthesis in mycobacteria. Of the B12 biosynthesis genes, *cobU* encodes an enzyme that functions late in the assembly process and is less conserved between *Mtb* and *M. smegmatis* homologs than other genes in the pathway. The goal is to create a *cobU* knockout mutant in *M. smegmatis* and determine if B12 production can be restored by introducing the *cobU* gene from *Mtb*. Vitamin production will be examined using auxotrophic salmonella strains and by mass spectroscopy. A plasmid designed for use in knocking out *cobU* by homologous recombination will have the following features: ~1000-bp *cobU* flanking regions, an origin for replication in *E. coli*, a hygromycin resistance gene, and a sucrose counter-selection marker. Progress toward the completion of this plasmid and of the overall project will be presented.

Abstracts

Effect of Different Pheromones on the Transcriptional Activator LuxR in *Vibrio fischeri*

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In the marine bacterium *Vibrio fischeri*, bioluminescence is regulated in part by the pheromones *N*-3-oxo-hexanoyl-L-homoserine lactone (C6) and *N*-octanoyl-homoserine lactone (C8). These pheromones bind to and activate LuxR, resulting in induction of the *lux* genes responsible for luminescence. In this study we compared the response of four LuxR variants to different concentrations of C6 and C8. Bioreporter strains were constructed with luminescence controlled by one of four different LuxR's. We used two artificially evolved LuxR derivatives (LuxRA and LuxRB), and the wild-type LuxR's from *V. fischeri* strains ES114 and MJ11. ES114 and MJ11 have different luminescence and pheromone outputs in culture, and we hypothesized that they had evolved LuxR's with different responsiveness to C6 and C8. Using the Bioreporters, luminescence was compared with the addition of different concentrations of C6 and C8, alone and in mixes. With both LuxRES114 and LuxRMJ11, increased concentrations of C8 inhibited the stimulation by C6. In addition, lower concentrations of C6 elicited a luminescence response with LuxRES114 compared to LuxRMJ11. The differences in the two artificial LuxR derivatives were also compared. LuxRA responded similarly to C6 and C8. LuxRB responded to C8 but not to C6, and high concentrations of C6 could inhibit the stimulatory effect of C8. Our results raise exciting questions regarding the evolution of LuxR and its relationship with two distinct pheromones in *V. fischeri*.

Drug and Mental Health Courts in Georgia's Criminal Justice System

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Georgia's incarceration rates and annual budget have doubled over the past two decades. Without change, these trends are expected to continue in the years to come. One suggested solution is to increase the number of accountability courts, or courts that address a specific population while adhering to standard operating principles. These courts focus on the mentally ill and drug offenders that make up a significant portion of the prison and parole populations in the state. The purpose of this research was to compare the effectiveness of expanding the accountability court system with other alternatives that may address the same problem. Data included recidivism rates, cost estimates, current legislation, and past success rates of each alternative. An impact and goals analysis on feasibility, cost, and effectiveness was used to compare the options. The data supported the conclusion that accountability courts will be effective in lowering recidivism rates in addition to being cost effective and feasible to implement. This result has important implications for Georgia's criminal justice system, including increased promotion of humanitarian values and an estimated savings of $264 million over the next five years. Recommendations for implementing this policy and the challenges that it may bring are provided.

Autophagic Responses in the Murine Model of Placental Malaria

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Plasmodium falciparum is the deadliest malaria-causing parasite in humans. Malaria during pregnancy is associated with the accumulation of parasitized red blood cells and infiltration

of leukocytes in the placenta. This is known as placental malaria (PM). Autophagy is a vital catabolic process which involves cells degrading and recycling cytosolic contents because of nutritional deprivation and stress. We hypothesized that PM's symptoms will induce excessive autophagic activity in the placenta which contributes to poor birth outcomes. We have initiated studies on PM using *Plasmodium chabaudi* AS to infect C57BL/6J and A/J mice as models for understanding the immunopathogenesis of PM. On day zero of pregnancy, mice are infected with *P. Chabaudi* inoculum. Throughout gestation, secreted cytokines and chemokines are assayed by ELISA. At sacrifice, spleens and fetoplacental tissues are homogenized for proteins and RNA isolation. RNA is made into cDNA and real-time PCR is performed to assess levels of autophagy-related genes. Immunohistochemistry is performed to histologically view markers for autophagy-related proteins. Autophagy marker (LC3a, LC3b, BEC-1, and Atg5) levels are compared between infected pregnant A/J and B6 mice and their respective uninfected counterparts. Preliminary data indicate that *Plasmodium chabaudi* induces local and systemic profinflammatory responses, and autophagic response data will be analyzed to assess correlation with pregnancy outcome. In conclusion, our research analyzes the mechanistic basis for malaria-induced compromise of pregnancy, especially midgestation, when high parasitic density is coincidental with pregnancy loss in our model. Continued study promises to reveal common and critical mechanisms which contribute universally to malaria compromised pregnancies.

Academic Steroids: The Need to Control Adderall Abuse on University Campuses

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Adderall is an amphetamine drug that is prescribed to treat symptoms in patients diagnosed with ADHD. While it treats excessive hyperactivity, impulsivity, and inattention, it can be highly addictive and has serious side effects including insomnia, anxiety, dizziness, and cardiovascular or psychiatric problems. Modern trends show that university students are abusing prescription Adderall when they do not have ADHD because it provides "laser-like" focus and enhances academic performance. Surveys show that 25 percent of college students admit to using Adderall to help prepare for and take exams. The increased abuse of Adderall has caused health problems in students; the number of 18-25 year-olds going to the ER because of ADHD stimulant medications has risen from 2,131 in 2005 to 8,148 in 2010, and half of those visits involved nonmedical uses of those medications. Though literature indicates that this is a growing problem in America, very little has been attempted from a policy standpoint to prevent it. Following an extensive literature review and after conducting interviews with administrators and health professionals at the University of Georgia, a policy has been developed in order to best address this growing concern for university students. The most feasible approach to solving this problem is to include Adderall awareness education in required student drug and alcohol education in order to combat students' lack of understanding of the dangers of Adderall abuse and its nature as a violation of student academic honesty code.

The Influence of Muscle Heme Concentration on Optical Measurements of Mitochondrial Capacity

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Near infrared spectroscopy (NIRS) has been used to measure muscle mitochondrial capacity in healthy and diseased humans. The NIRS technique uses changes in heme oxygen levels to measure mitochondrial capacity; however, patients with diseases could have reduced heme concentrations. The purpose of this study is to test whether changing muscle concentrations of blood alter the measured mitochondrial capacity. We first learned how to perform muscle mitochondrial capacity measurements using NIRS. Then measurements were made to select the muscle of interest (either vastus lateralis or medial gastrocnemius), and the type of exercise to perform (voluntary or electrical stimulation). Muscle heme oxygen levels were made with a commercial NIRS device (Portamon, Artinis LTD). After metabolic rate was increased with exercise, the rate of recovery of oxygen consumption was measured. A series of short duration ischemic periods produced by rapidly inflating a blood pressure cuff was used to measure oxygen consumption during recovery. The individual oxygen consumption measurements were fit to an exponential curve and a rate constant determined. The experiment will measure mitochondrial capacity in healthy college aged students before and after five minutes of venous occlusion (60 mmHg) to fill the muscle with blood. Voluntary exercise of the medial gastrocnemius will be used. Six subjects will be tested as prior studies suggest a medium effect size can be detected with this sample size. We predict that while venous occlusion will increase blood volume in the muscle, it will not change the rate constant related to mitochondrial capacity. NIRS studies of muscle are either ongoing or planned for people with SCI, ALS, COPD, PAD, and heart failure. This study will be very important in helping us interpret the results of the clinical testing.

Developing a Sustainability Policy for the University System of Georgia

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With more built space than any Georgia state agency, the University System of Georgia has a significant impact on the energy budget of the state. But with student enrollment and square footage expanding every year, the system remains one of the largest university systems nationwide not to have a comprehensive sustainability policy to address associated growth, operations, and emissions. Additionally, this policy gap creates varying levels of funding and administrative commitment to sustainability and sustainability planning among the 35 individual institutions. Mechanisms in said sustainability policy should create new funding for sustainability initiatives, facilitate renewable energy purchasing and production, institutionalize sustainability planning, and involve students in the research/implementation process. The alternative that maximizes these qualities at lowest cost and ease of implementation is to standardize the green fee process, the self-imposed mandatory student fee. By reducing administrative barriers and promoting self-determination, the fee provides flexible funding for projects ranging from energy efficiency to green power purchasing. Clear allocation guidelines, such as those in policies from Tennessee and California, ensure that the funds are not used onerously on administrative costs and ensure student participation in administering the funds. As fuel costs and energy demand rise and state education funds take uncertain trends, controlling operations costs in a sustainable and inclusive manner is an essential part of the university system modeling responsible

investment, application of research, and student engagement.

Pervasiveness of Science News in First-world Countries vs. in Emerging Economic Powerhouses

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Many industrialized nations believe their leading national newspapers present accurate and adequate coverage of health and science news. However, financial hardships have caused many major print media to eliminate dedicated science sections. Therefore, the goal of this study is to assess science coverage in media within five countries – two industrialized countries, the US and the UK, and emerging economic powerhouses Brazil, South Africa, and India. I intend to gauge the pervasiveness and depth of science coverage in these countries using methodology similar to that employed by Veneu, Amorim & Massarani (2008) in a study on science coverage in Latin American countries. Using online versions of daily newspapers, I will choose two media sources from each country – one with a dedicated science section and one without – and will collect all science articles on the website for the same one-month period. Dailies without a dedicated science section will be searched for articles using key terms selected from science news aggregating websites like *Futurity* and from science articles in the selected papers with science sections. I expect most newspapers with a science desk will have fairly consistent coverage of science news, but daily papers without one will show stronger coverage in the U.K. and the U.S. than in Brazil, South Africa, and India.

Mitochondria Targeted Delivery of Cisplatin Prodrugs

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Targeted delivery of therapeutics to tumor cell mitochondria could potentially be a powerful approach to selective cancer treatment. Cisplatin is one of the most widely used anticancer therapeutics, most notably for the treatment of ovarian and testicular cancer. Research focuses on minimizing cisplatin's toxicity and overcoming the resistance of the drug. Only 5-10% of the Pt(II) compound cisplatin that enters cells binds to its targeted nuclear DNA. We speculated that by re-routing the cisplatin in the form of a pro-drug and by using a mitochondria-targeted nanoparticle-based delivery vehicle to the mitochondria of cancer cells, thereby attacking the mitochondrial DNA, we would be able to provide a new therapeutic target for the age-old drug cisplatin. A promising strategy for achieving this goal will be discussed.

The Birth of Metrosexuality in South Korea

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In a rapidly modernizing world, clothing styles are expected to change according to the cultural standards of each generation. Despite this, the sudden eruption of the phenomenon of metrosexuality—characterized by individualistic and aesthetic male dress styles among young men (Yung, 2011)—in a conservative and collectivist society like South Korea is a paradox that symbolizes a lot more than just a change in fashion trends.
To explore the reasons for the cultural and social metamorphosis that underlies the emergence of South Korean metrosexuality, I have examined numerous academic sources

that discuss the country's shifting definition of masculinity and the transformation of its gender ideals. I found that in South Korea's patriarchal society masculinity is equated with mandatory military service, with men's financial ability to provide for their family, and with men's continuing rejection to participate in domestic labor activities. I realized that events such as the end of the Cold War, the 1997 IMF financial crisis, and the "Korean Wave" appear to be responsible for the birth of South Korean metrosexuality and the erosion of its traditional gender ideals. I argue that because of these occurrences South Korea's concept of masculinity has become flexible, malleable, and multi-dimensional. The new concept of masculinity is not confined to a simple distinction between "metro" or "masculine." Instead, it is a hybrid masculinity. Although the average young South Korean male dresses as a metrosexual, which would suggest a soft form of masculinity, the way he treats women and acts in his daily life continues to be driven by a traditional, male chauvinist attitude.

What Differentiates Certain Salmonella Serovars from Others in Their Ability to Cause Human Illnesses?

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Salmonella enterica causes one million cases of gastroenteritis each year in the US. While certain Salmonella serovars cause thousands of illnesses annually, others are linked to only a handful of cases. *Salmonella Mikawasima*, a serovar from the coastal waters of Georgia, contributes to substantially fewer cases of salmonellosis than serovars such as *S. Typhimurium* and *S. Enteritidis*. In the Maurer lab, additional novel serovars have recently arrived, fully sequenced. I hypothesized that this disparity in virulence was due to differences in the distribution of pathogenicity islands (PAI) between *S. Mikawasima* and other more virulent Salmonella serovars. To test this hypothesis, we performed whole genome sequencing on a previously uncharacterized *S. Mikawasima* and compared its sequence to several published Salmonella genomes. We identified several PAIs and prophage genomes shared with a referenced Salmonella genome, LT2. We also determined *S. Mikawasima*'s evolutionary relatedness to other Salmonella serovars commonly associated with outbreak by focusing our phylogenetic analyses on a series of housekeeping genes common to several annotated Salmonella genomes. After analyzing our data, we found that *S. Mikawasima* was more closely related to a subdivision of environmental Salmonella than those serovars (*S. Enteritidis*, *S. Typhimurium*, etc.) commonly associated with human illnesses. *Salmonella Mikawasima* shares the same virulence composition as other Salmonella serovars commonly encountered in foodborne outbreaks. Rare occurrence of human illnesses associated with this serovar is more likely due to its distribution in nature. My thesis will detail my findings concerning these novel strains and the degree of relatedness between them and other highly pathogenic serovars.

Fanny Kemble: A Juliet of a Different Era

Hannah Klevesahl
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I will analyze Frances "Fanny" Kemble's interpretation of the role of Juliet in William Shakespeare's *Romeo and Juliet*. In analyzing her interpretation of the character, I will connect it to a historical point in time: the period of the American Civil War. Fanny Kemble, a British actress, married the plantation owner Pierce Butler and settled on his plantations on the Sea Islands in Georgia. Fanny was appalled by the treatment of the slaves and their working conditions, but was threatened with revocation of access to her daughters if she published anything about those experiences with slavery. Fanny Kemble

eventually separated from her husband and began touring in the United States as a notable Shakespeare reader. The Richard B. Russell Special Collections Library is fortunate enough to have Kemble's original copy of Shakespeare's "Works," in which she details many of her character analyses and her own rehearsal processes. With the help of Dr. Fran Teague, I will relate Fanny Kemble's interpretation of Juliet with her own disconnect from the slavery that she was faced with on Butler's Sea Island plantations. Juliet is forced to choose between two worlds, much like Kemble herself, who had to choose between access to her daughters or speaking out against what she thought was wrong. The actor's connection to the role of Juliet comes from a personal experience that encourages a different interpretation of the performance.

Trout Angler Awareness of the Hemlock Wooly Adelgid and Its Effect on Trout Habitat and the Available Treatment Methods

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The Hemlock is a riparian tree that provides shade that keeps water temperature low in North Georgia streams and rivers. Hemlock Wooly-adelgid (HWA), an invasive insect accidentally brought from Asia, has recently become a factor in the death of Hemlock trees, resulting in high stream temperature and unsuitable habitat for trout. Brook trout, a trout native to the mountain streams of Georgia, cannot survive water temperatures above 77◦ F. This may lead to decline in the population of trout and other aquatic species. This could mean a lower catch rate and lower recreational satisfaction for Georgia trout anglers. While there are a number of treatment methods available to contain HWA, some are more harmful to the environment in general and aquatic species like trout. In addition, application of treatment methods in public lands could cost anglers in terms of increased access fee, license fee, etc., and expensive methods might not be a desirable option. The objective of this survey is to assess the trout angler's knowledge of and attitudes towards HWA and its potential impact on their fishing experience. This survey will also analyze and compare the acceptability of the different treatment methods among trout anglers. To meet these objectives, a convenient sample of trout anglers in Georgia is being sampled using a paper-based survey instrument. To increase the response rate, a variety of approaches have been taken to recruit participants in the survey. One approach is surveying trout anglers on-site at popular fishing areas. Another approach is surveying anglers at statewide trout fishing conventions and gatherings where a variety of trout fishermen will be in attendance. So far completed responses from 70 anglers have been obtained. Data is being analyzed using descriptive statistics and ANOVA tests. The majority of fishermen surveyed so far agree with the statements that Hemlocks are a valuable tree species and are being negatively affected by HWA. They also find the environmentally friendly treatment methods such as trunk injections and predator beetles to be more acceptable than soil treatments or foliar spray. The majorities are members of Trout Unlimited and, therefore, are assumed to be more specialized fishermen. This information will help researchers to understand what the majority of fishermen value, justify the protection of the hemlock trees along rivers and waterways and find treatment methods that are acceptable to fishermen who may have their values at stake in the deteriorating condition of trout habitat.

Abstracts

Key to Thrive as Larvae: Cross-fostering Analysis between Two Species of Burying Beetles, *Nicrophorus vespilloides* and *Nicrophorus orbicollis*

Kyungmin Ko
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Parental care is a specialized behavior found mainly in vertebrates. However, this evolutionary strategy exists in some insects, including burying beetle species such as *Nicrophorus vespilloides* and *Nicrophorus orbicollis*. Parental care in these two species is divided into two types of behaviors: indirect parenting, which is more commonly found in insects and direct parenting which is rarely found. Indirect parenting involves behaviors caring for the carcass, and direct parenting involves behaviors that directly interact with the larvae, including feeding the larvae mouth to mouth. Direct parental care given during the first 12 hours to *N. vespilloides* and *N. orbicollis* larvae is required for the survival of larvae. However, little is known about the amount of parental care provided by parents of each species and keys that trigger parenting for larvae of these species to thrive. Given that direct care rarely evolves, is it specialized in a species-specific manner or is the parenting of burying beetles generic? I tested this question using cross-fostering between species to measure the response of larvae to parental care given by an adult of the same or of a different species. The timing in which larvae appeared was controlled, because *N. orbicollis* required a longer time for their eggs to hatch due to their larger size. I found that parental care provided to larvae across the species is only subtly different, in that larvae survived as well if cared for by their own or a different species. Therefore, the larvae of these species need generic parenting to flourish.

A Comparison of the Effectiveness of Plant DNA Extraction Methods against Two Common Secondary Metabolites

Delaney Kolich
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Extraction of high quality DNA is usually required before performing downstream protocols such as PCR amplification or gene sequencing. However, extraction of DNA from plant tissue is often complicated by the presence of secondary metabolites, resulting in poor DNA quality or low yield. Success of the extraction is largely dependent upon the protocol used and the types and amounts of secondary metabolites produced by the study species. Alkaloids and terpenoids are frequently problematic secondary metabolites in DNA extractions. This study compared the quality and quantity of DNA extracted from *Asimina triloba* and *Vinca minor* (both produce high levels of alkaloids) and *Pinus strobus* and *Aloysia citriodora* (high terpenoid production) using a CTAB (cetyltrimethylammonium bromide) extraction, an SDS (sodium dodecyl sulfate) extraction, and a Qiagen DNeasy kit. Preliminary analysis of extracted DNA was performed using NanoDrop spectrophotometry and agarose gel electrophoresis. Preliminary quality and quantity measurements were then confirmed by analysis of representative samples from each species and extraction method using an Agilent Bioanalyzer. Observation of the differences, if any exist, in the effectiveness of these extraction methods against two common secondary metabolites could help guide researchers in selecting a DNA extraction method to begin work with new species of study.

Abstracts

Annotation of the *Sarcocystis Neurona* Genome - Challenges and Lessons Learned

Katharine Korunes
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Sarcocystis neurona, a protist parasite of the phylum Apicomplexa, causes equine protozoan myeloencephalitis (EPM). We have undertaken the sequencing and annotation of the *S. neurona* genome. The completed sequence and annotation will hold significance for the equine industry and provide biological insights. We started with genome sequence data produced by 454 and Sanger, and transcriptome sequence data produced by 454 and Illumina. The RNA-Seq data was mapped to the genome using the reference-based TopHat/Cufflinks, and a *de novo* assembly was created with Trinity. RNA-Seq assembly data were used to generate gene predictions. However, predictors require training, and their outputs are often not consistent with each other. The process is further complicated by the fact that this is the largest genome found in the Apicomplexans, a phylum in which a large number of the genes, ~40%, are hypothetical. To approach the challenges presented by this genome, we decided to create a metric for evaluating the quality of our assemblies and improving gene-predictor training: the set of 1,000 orthologs found in the 15 other sequenced genomes in the phylum. We identified 782/1000 orthologs in *Sarcocystis*, and we annotated this set of conserved genes. Having manually analyzed the evidence and refined the annotations for this set of 782 genes, we now have a standard that is allowing us to evaluate the performance of several automated gene predictors and improve their performance in our automated annotation pipeline. This process is bringing us closer to a completed, high-quality genome annotation.

Influence of Weight Distribution on Biomechanics of Performance Horses

Simone Lalvani, Lauren Cobb
Dr. Kylee Duberstein, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Injuries to a performance horse's lower leg are common and often result in lameness causing the horse to be retired. If a horse's gait is asymmetrical, then there is a possibility that the angles of joints directly related to weight bearing will affect the pressure placed on lower leg bones and tendons. One can assess the impact of this on the longevity of the horse's career by analyzing the relationship between asymmetrical rider weight distribution and its influence on the corresponding joint angles and other stride parameters. Using synchronized high-speed cameras, eight sound horses were recorded for multiple repetitions trotting through a 24.4×1.5 meter chute to evaluate stride length, velocity, swing time, stance time, and angles of front and hind leg using the program EquineTec. Each horse was subjected to three treatments in a random order: no added weight, equal distribution of 45 kg added weight, and unequal distribution (40:60) of 45 kg added weight. Observations indicate that horses bring their limbs farther underneath their center of gravity when carrying a load. Unequal distribution of weight does result in some gait adaptations, primarily in the proximal portion of the limb compared to the distal portion. Some natural gait asymmetry is present in horses, as observed by asymmetrical effects on fetlock dorsiflexion. Research of this topic is limited due to the difficulty of creating standard conditions measuring appropriate values to determine if there is an association between rider weight distribution and degree of lameness.

Abstracts

Grandparenting from the Dump

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Data from 10 Cambodian grandparents raising grandchildren around the Phnom Penh Municipal Dump were collected through in-depth interviews and were analyzed using multi-stepped coding techniques. A multitude of factors that inhibit individuals' quality of life can arise in families in grandparent-headed households. It is typical that in such settings the middle generation is missing due to deaths or because of out-migration in search for better economic opportunities. An HIV/AIDS epidemic that has claimed large numbers of reproductive-aged members of society, few options for earning a living wage, and the resultant chronic poverty from these conditions have exacerbated the resources of many of Cambodia's families. Under the family stress theory, we propose that custodial grandparenting in skipped generation families triggers new challenges for older caregivers because this role is non-normative. This shift adds financial, emotional, physical, and psychological burdens to the grandparents, most of whom are in extreme economic crisis. Many must relearn childrearing under dire conditions. The themes from the interview narratives included the following: poverty and food insecurity, health concerns, and social disengagement. The grandparents alluded to the need for better respite care but also showed a great concern for the advancements of their grandchildren through educational achievements. These findings point to the need for better community empowerment and deliberate policy and welfare planning to cater to the needs of impoverished older grandparents heading grandfamilies.

Transforming Animal Shelters in to a Service-based Economy

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Big Black Dog Syndrome, the extreme under-adoption of large black dogs in shelter settings, identifies certain characteristics adopters have historically discriminated against, which include specific breed types and traits (e.g. high energy, intense focus). Costing U.S. taxpayers a total of $2 billion to impound, shelter, euthanize, and dispose of homeless animals annually, these "problem dogs" account for a significant burden of that expenditure. The current model fails to realize key indicators of these dogs as potential candidates as service dogs. A thorough review of existing literature and economic modeling was conducted to develop a policy proposal to support a standardized screening process for these dogs and their selection to the type of service that suits each canine best, such as in handicap assistance, drug and bomb detection, therapy, and PTSD support. After evaluating various policy alternatives based on a cost-benefit analysis, the selected proposal focuses on cultivating working relationships between service dog training organizations with established internal breeding programs and shelters in order to encourage consideration of shelter dogs as a resource. Specifically, the policy would provide an educational mechanism to eliminate the stigma against using shelter dogs in service work, create a centralized network to identify service dog candidates within shelter environments, and establish pathways to facilitate transfer of these dogs to service dog providers. The innovative association will reduce the costs and public health concerns related to shelter overpopulation while increasing opportunities for the successful placement of some historically less adoptable dogs as service dog candidates.

Abstracts

Rekindling the Hermit Kingdom
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North Korea continues to threaten international security and stability in East Asia. As global attention is diverted elsewhere, North Korea will continue its pursuit of nuclear weaponry. The Kim Jong-Un regime is altering its economic policies, going as far as allowing farmers to trade their crop, relaxing tourism, and reforming education standards. The United States' reluctance to participate in diplomacy is a fatal foreign policy that does not take advantage of the unique political climate. Economic engagement is the best way to jumpstart better relations with North Korea and pave the way for a well-coordinated and peaceful East Asia. Data demonstrates an increasing number of the North Korean population warming up to private economic practices. The purpose of the research is to explore possible alternatives to established American foreign policies and how it can impact prospective long-term interests in East Asia. The research accounts for empirical economic data used by Chinese companies and historical examples as a threshold for newer, better alternatives. In addition, statistics taken from research organizations will evaluate public and international perception of such alternatives. The alternatives discussed are the following: the status quo, a peace process, the establishment of a US-Sino trade partnership, and a comprehensive Six-Party aid package. These alternatives will be evaluated using criteria in the form of effectiveness, political feasibility, and cost. With Chinese investment in North Korea also steadily increasing and the interests of its allies in East Asia in mind, the United States should take initiative to normalize relations with North Korea and globalize its development. Satellite imagery demonstrates an expansion in rocket launch sites, and there is evidence that North Korea will be preparing numerous missile tests. Neglect of North Korea is an act of appeasement and North Korea is taking the opportunity to bulwark its belligerent rhetoric. With the Kim Jong-Un regime slowly sealing its power over the nation, the United States must take action. Economic engagement will result in long-term infrastructure development and better political decency.

Pharmacological Manipulation of the Neuromuscular Junction between Stem Cell Derived C2C12 Muscle Cells and Motor Neurons
Natalie Levey
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Nerve and muscle diseases are causes of conditions like amyotrophic lateral sclerosis and muscular dystrophy. Motor neurons (MN) synapse with muscles at neuromuscular junctions (NMJ). Excitation of MNs causes depolarization and releases acetylcholine (ACh), which diffuses across NMJ and stimulates muscle contraction. Replacing diseased tissues requires functional restoration of neuromuscular units. The purpose was to investigate the functional interaction between MNs and muscle cells, derived from stem cells. C2C12 myoblasts were differentiated into myotubes and cultured with differentiated MNs. Pharmacological manipulation was performed when cells began contracting five days after co-culture. Two experimental groups were used: 1) C2C12 + MN and 2) C2C12 only. Both were observed contracting before manipulation. Glutamate (10uM to 100uM) was used as an excitatory molecule that stimulates MNs. D-Tubocurarine (50uM and 100uM), ACh receptor antagonist, was used to block neuromuscular transmission. Unexpectedly, when C2C12 + MN plate was stimulated with glutamate (100uM), contractions stopped. In C2C12 only, glutamate (20uM) terminated contraction. Therefore, motor neurons affected contraction of muscles by dampening

inhibitory effects of glutamate in co-cultures. D-Tubocurarine (100uM) inhibited muscle contraction in both groups, while (50uM) had no effect, suggesting contractions were not initiated by MN. These preliminary results will be extended to investigate pharmacological effects on NMJ in co-cultures where muscles have not progressed to the contractile state to determine if functional neuromuscular units can be regenerated from stem cell-derived MNs and muscle cells. Once contractions can be manipulated, it will be possible to create more neuron-muscle systems that mimic the actual biological system.

Parental Meta-emotion Philosophy as It Relates to Child Emotional Functioning

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Parent meta-emotion philosophy (i.e., beliefs about emotion) is revealed through parental emotion coaching and communication regarding the identification, acceptance, and remediation of children's emotion experiences (Gottman, Katz & Hoovan, 1996). Emotion communication predicts child socioemotional adaptation (e.g., Gentzler, et al., 2005; Eisenberg et al., 1996), but further research is needed to examine a parent's meta-emotion beliefs as correlates of parent and child emotional functioning (Gottman, et al. 1996). We hypothesized that high parent awareness, acceptance and coaching would correlate with high child awareness and expressivity, and low child dysregulation, all of which were measured via parent and child Meta-Emotion Interviews (MEI; Gottman et al., 1996), and that parent/child MEI would correspond with measures of parent/child emotional functioning. Participants included 34 diverse mother-child (5-12 years) dyads who completed MEIs, parent self-report measures (Parental Stress Index- Short Form, Abidin, 1995; Difficulty in Emotion Regulation Scale, Gratz, 2004) and child self-report measures (Childhood Depression Inventory, Kovacs, 1992; Multidimensional Anxiety Scale for Children, March, 1997). Bivariate correlations revealed that child emotion expression was related to parent's emotional functioning: high parenting stress with less expression of sadness ($r = -.531$, $p = .013$) and anger ($r = -.485$, $p = .019$); parent emotion dysregulation with less expression of anger ($r = -.369$, $p = .064$). Children's greater comfort expressing anger was related to lower child depressive symptoms ($r = -.351$, $p = .092$). Coding of parent MEIs is underway to test other study hypotheses. Results suggest the importance of parent/child meta-emotion in child emotional functioning.

Mapping Narrative: The Structure and Composition of a Short Story Cycle

Daniel LoPilato, CURO Graduation Distinction
Prof. Reginald McKnight, English, Franklin College of Arts & Sciences

The first problem of studying the short story cycle—or the novel in stories, or the composite novel, or the novita—is one of terminology; what do we call it? This problem is resonant, however, of the broader problem of genre. When we speak of story cycles, we speak of an assemblage of stories which relate broadly in theme and characterization, even plot. Is the short story cycle, then, a novel told in stories, or is it a story collection that tells a novel? I will examine this question and another larger concern, in tandem with my ongoing composition of an original manuscript: the gesture toward myth. The story cycle, like the novel, tells a tale of breadth and scope; and, like the epics of Homer and Virgil, it tells a tale grounded in the episodic nature of the oral storytelling tradition. In light of literary theorists like Walter Benjamin, who examined the short story and its divergences from the novel, I will discuss three principle works—James Joyce's *Dubliners*, Sherwood Anderson's *Winesburg, Ohio*, and Ray Bradbury's *The Martian*

Chronicles—and their effects on the structuring and execution of my own creative thesis, the foundation of a story cycle investigating the notion of personal and cultural myth. My research will add a new voice to the narrow field of scholars studying the short story cycle and lend insight into the creative concerns of a writer at work.

Study on the Ste24p Zinc Binding Motif, Ste24p Substrate Loading Mechanism, and Archae Ste24p Homologs

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Ste24 is a protease that is involved in the processing of prelamin A in humans, the yeast a-factor mating pheromone, and unknown targets in other species. Mutations in human Ste24 may result in progeria, a disease characterized by accelerated aging. Ste24p is highly conserved among many species, so much so that yeast Ste24p can be functionally substituted by a eukaryotic ortholog, allowing for investigations relevant to disease in the case of human Ste24. Analyses of Ste24p have largely been limited to yeast and mammalian Ste24p. In this study we have cloned and expressed Ste24p from *Pyrococcus furiosus*, a species in the archae domain, in *Saccharomyces cerevisiae*. An *in vivo* assay based on a-factor production revealed a lack of enzymatic activity in this recombinant yeast strain, suggesting that functional similarity among Ste24p enzymes may be restricted to eukaryotic species. We are also investigating the importance of residues that are involved in coordinating a catalytic zinc cofactor associated with Ste24p. We have evidence that the mutation of a Glutamate residue at position 390 in yeast Ste24p abolishes activity as measured through an a-factor production based *in vivo* assay. The potential role of other residues in the substrate loading properties of Ste24p were investigated through analysis of recent structures defined for both *S. cerevisiae* and human Ste24p with a Difference Distance Matrix program. These studies are expected to provide more information on the enzymatic properties of Ste24p, leading to a better understanding of the role of this protease in disease.

Cope's Gray Treefrog's Preference to Occupy Different Colors of Artificial Refugia

Michelle MacKenzie
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Treefrogs are beneficial to biologists as ecological indicators. Polyvinyl chloride (PVC) tubes are used to sample treefrogs in pine plantations. A technique that incorporates the biological capabilities or perceptual preferences of the animal is rare and makes this study unique. Use of artificial refugia is not an effective method in the Piedmont region. However, studies on amphibian color vision have demonstrated that the color white, the color of PVC pipes, is a wavelength that is avoided by treefrogs. These studies have also demonstrated that amphibians prefer to go to blue wavelengths. In this study, we conducted a controlled lab experiment to test Cope's Gray Treefrog's preference to occupy different colored artificial refugia. Treefrogs were individually placed in nylon mesh cages. Sixty-centimeter long PVC pipes with an inside diameter of 3.81 centimeters were spray-painted either blue, brown, or white. One of each color was placed in each cage. The tubes were terminally capped and filled with 15-centimeters of water. Each day, the color tube occupied was recorded. Refugia were rinsed to remove any trace pheromones and then replaced in random orientation. Frogs were removed from the study after 10 selections. We performed a one-way ANOVA test that indicated a color preference ($p < .001$) and a Tukey HSD post-hoc test showed that blue occupancy was more common than

brown and white PVC refugia, while there was no difference between brown and white. Thus, we recommend the use of blue refugia to be used in place of white refugia.

Development of a PCR-based Marker to Identify Overwintering Sites for *Exobasidium sp.* on Blueberries in Georgia

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An emerging disease in Georgia and the southeastern United States, *Exobasidium sp.* is a fungus that causes fruit and leaf spots on blueberry that significantly decreases marketable yield of berries. We are interested in understanding the disease cycle, particularly where the fungus overwinters, so that improved management strategies can be developed. Our hypothesis is that *Exobasidium sp.* overwinters in buds of blueberry plants. *Exobasidium sp.* grows very slowly and is difficult to isolate from other fungi on growth medium, so in order to detect it we have developed an *Exobasidium*-specific PCR-based marker using primers for the internal transcribed spacer (ITS). Results demonstrate that successful amplification of ITS is possible even at low *Exobasidium* cell concentrations (≈4 CFU/μL) in the presence of blueberry plant DNA, indicating that our PCR-based marker is reliable for detection of potential overwintering sites. We used our marker to detect the fungus in blueberry buds, other plant tissue, soil, and plant debris collected from highly diseased South Georgia field plots prior to disease outbreak in the spring. We compared our results with low-disease plots at the same site and a control site in Watkinsville, GA where disease was not observed. Our expectation was that there would be frequent detection of *Exobasidium* sp. with the PCR-based marker in blueberry buds from highly diseased field plots, less frequent detection in buds from low-disease plots and no detection at the control site.

From Feudalism to Democracy: Using Political Philosophy to Reframe Traditional Distinctions between the Great Ages of Europe

Dalton Mark
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This paper will examine the development of political philosophy in Western Europe during the fourteenth through eighteenth centuries. It is a refutation of the traditionally held perspective that the iconic periods of history were distinct ages, arguing instead that these periods were different stages in a larger global trend. The Middle Ages, the Renaissance, and the Enlightenment were together one extended reassessment of humanity and man's place in the world. This paper will examine the writings of such notable political philosophers as Dante, Brandolini, Machiavelli, More, Bodin, Montaigne, La Boetie, Hobbes, Locke, and Rousseau to demonstrate that political trends transcended political borders. I will focus first on Italy from the fourteenth century to the seventeenth century to explain the transition from a religion-infused feudalistic structure to an anti-monarchical despotism. Then I will focus on France and England from the seventeenth century to the eighteenth century to explain the transition to a democratic notion of the social contract. These political changes are demonstrative of the change in perspective of society from the importance of strong rule over an inferior public to the justice of a symbiotic relationship between rule and people. My research will demonstrate that this change in mindset did not begin and end in one year or another – it was instead a gradual transition that took place over several centuries. This reframing of the intellectual movements is important to properly understanding the progression of history and the foundations for various political structures in place today.

The First Rule of Camorra is You Do Not Talk about Camorra: An Investigation into the Rise of the Organized Crime Syndicate in Naples, Italy

Dalton Mark
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In Naples, Italy, an underground society has a hand in every aspect of civilian life. The success of this crime syndicate, and others like it, is predicated on a principle of omertà – a strict silence that demands non-compliance with authority and non-interference in rival jobs. Presumably birthed out of the desperation of impoverished citizens, the Camorra has grown over the last three centuries to become the most powerful force in southern Italy. Nonetheless, in 1911, the Camorra was brought to a mass trial, resulting in the conviction of twenty-seven leaders. Unfortunately, the Camorra, indefatigable as always, has continued to run their illicit operations through recent decades, despite any arrests that may be made. It is important to understand the roots and methods of the Camorra because it is and will probably remain the uncontested strongest force in southern Italy. Research for this paper was based in secondary sources to synthesize the various theories and perspectives on this dangerous gang. Results showed that their resilience is based on their size, their depravity, their decentralization, and perhaps most importantly, the corruption of the government attempting to supplant them.

The Use of Scheduled Combination Treatments of Etoposide and Doxorubicin to Treat Feline Injection Site Sarcoma Cells

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Doxorubicin and etoposide, topoisomerase inhibitors, are known chemotherapy drugs utilized to treat select cancers in humans and veterinary species. A combination of chemotherapeutic drugs at doses lower than the IC50 could improve the therapeutic index of anticancer drugs, such as etoposide and doxorubicin, whose individual success rates are deterred by adverse side effects and drug resistance. The overall objective for this study was to determine the level of cell proliferation inhibition of feline injection site sarcoma (ISS) cells with doxorubicin and etoposide in scheduled combination treatments. ISS cells in monolayer cultures were plated in 96 well plates with treatments applied to quadruplicate wells followed by the timed addition of IC50, IC25, and IC12 concentrations of etoposide and doxorubicin. One treatment protocol consisted of adding different concentration combinations of both drugs within the same period of time. The second treatment protocol involved adding different concentration combinations of the two drugs with a time period ranging from 24 hours to 48 hours separating the addition of the first and second drug. At 72 hours, Alamarblue™ dye was added to each well, and plates were read 8 hours after dye was added. The data indicated that scheduled combined treatments of the two drugs did positively reduce viable cell proliferation compared to controls. Thus, these preliminary results suggest that combination of these drug cocktails at doses lower than the IC50 are efficacious for treating feline ISS with possibly lower adverse risks to the feline host.

Comparison of Crustal Chemical Composition of the Carolina Terrane and Inner Piedmont Using Vp/Vs Ratios Obtained from Broadband Seismic Data

Abigail Maxwell
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Seismic data from several seismic stations in Georgia and South Carolina are collected and analyzed. The chemical compositions of the Carolina Terrane and Inner Piedmont are compared using Vp/Vs ratios to determine if

there are any differences in the crust in these two locations. The structure and thickness of the crust are determined by processing the data collected from the seismic stations and the differences in crustal thickness can therefore be compared and possible reasons for such differences such as difference in topography or orogenic events are considered. The travel times for P waves and S waves produced by earthquakes vary with chemical composition of the crust and any structural features such as faults or areas of high topography that may be present in the particular area of study. The reflection, refraction and transmission of the P waves are also considered when determining the structure of the crust.

Performance on a Saccade Task under Varying Cognitive Load

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Throughout the day we are bombarded with sensory input, and cognitive control processes help us determine what stimuli should be attended to or ignored. Eye movement tasks which require saccadic responses are excellent models for cognitive control processes in general because the stimuli can be tightly controlled and responses easily quantified. Thus, simple versus complex versions of the task can be compared. Prosaccades (rapid glances towards a visual stimulus) are more reflexive and easier to perform than antisaccades (rapid glances towards the mirror location of the stimulus). Antisaccades require the inhibition of a reflexive glance, are generally slower than prosaccades, and result in more errors. Previous research suggests that cognitive control may differ based on stimulus presentation. The current study will determine the response characteristics in a saccadic task involving manipulation of cognitive load, which will be done by varying the proportion of simple prosaccades to more difficult antisaccades on five separate runs. Participants will wear a headband with two small eyetracking cameras to record saccades. We will index the difficulty of each run based on reaction times and percent of correct trials to determine which proportion of simple and complex trials require the most cognitive control. It is hypothesized that a run with 50% prosaccades and 50% antisaccades will produce the greatest demand on cognitive control due to task switching. These results will add to our understanding of how cognitive control functions during eye movement tasks and possibly illuminate the limits of cognitive control processes within the saccadic system.

Development of Avian Infectious Bronchitis Virus-Like Particles

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Infectious bronchitis virus (IBV) is the causative agent of infectious bronchitis, a highly infectious, globally distributed and economically significant upper respiratory tract disease in commercial chickens. IBV is an enveloped, single stranded RNA virus. The virion is composed of four structural proteins, Spike (S), Membrane (M), Envelope (E), and Nucleocapsid (N). M, E, and N compose the viral particle and package viral RNA during replication in infected cells, while S projects from the surface of the virus and is responsible for attachment and binding to host cells. We hypothesize that virus-like particles (VLPs), functional virions with no internal cargo, can be constructed using the four structural proteins individually cloned into expression vector systems. Reverse-transcriptase polymerase chain reaction (RT-PCR) will be used to amplify the four structural proteins individually, and they will then be cloned into a novel expression vector system. Plasmids containing the four structural genes will then be transfected into a mammalian cell line to produce VLPs. We expect that the expression system will

efficiently produce IBV structural proteins, and that the proteins will associate in transfected cells to produce VLPs. Currently, we have successfully cloned the four IBV structural proteins into the expression vector system and are culturing mammalian cells in preparation for transfection. Developing an efficient viral protein expression system and then producing functional IBV VLPs will be significant because they can be used as a delivery system to cells of the avian respiratory tract.

The Need for Universal Design: An Environmental Assessment of Residential Interior Spaces and the Built Environment

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The Americans with Disabilities Act became law in 1992, mandating that all facilities integrate disability accommodations with those for the general public. Before 1992, individuals with disabilities were provided with separate facilities, if they were provided with any at all. The law stipulates that people with disabilities were a part of the general public and should be treated as such. While these regulations and standards made buildings and designed spaces more accessible to those with disabilities, they also discriminated against them, highlighting their differences. To combat this, some architects and interior designers began operating under the principles of Universal Design, which "implies that well-planned [spaces] will meet the needs of every user without drawing attention to persons with disabilities." To date, incorporating Universal Design into residential space plans and architecture is seen more as an option rather than a necessity. My research intends to demonstrate the importance of Universal Design in residential spaces. I used my first-hand experience of being temporarily handicapped to observe the difficulties disabled individuals face maneuvering in standard residential spaces beyond the typically included minimum Universal Design features. I made written observation and analysis about my day-to-day activities and challenges. I then detailed my findings in a weekly blog, highlighting the difficulties I experienced and how they could have been alleviated, to be used as a resource for other interior design students as they learn how and why it is important to incorporate Universal Design into their own work.

Policy Analysis: US-Afghanistan Reconstruction Efforts

Mackenzie McRae
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Operation Enduring Freedom [Afghanistan] includes a heavy reconstruction effort for Afghanistan's social, political, and economic infrastructure, notably the completion of the Afghani Ring Road highway system. The reconstruction efforts provide short-term solutions and fail to achieve long-term growth and stability. This analysis reviews the current US policy and proposes amendments to the US policy that will better incorporate current international infrastructure projects and Afghanistan's vast geopolitical trade potential. The current US policy addresses economic growth and road infrastructure as separate entities, but does not adequately incorporate Afghanistan's key geopolitical position. Neighboring states China and India, as well as the Asian Development Bank, have independently funded transport projects in Afghanistan, as the state is a regional bottleneck stifling transcontinental trade. This policy paper will analyze each US infrastructure project and propose a revised policy which better collaborates with non-US backed infrastructure projects in Afghanistan. The policy will use data on historical trade routes, incorporate the geographical distribution of Afghanistan's natural

resources, and the market demand to establish which infrastructure projects would best serve Afghanistan's economic growth. The U.S. has invested $100billion in to reconstruction efforts since 2002. Misappropriation of these funds will leave Afghanistan economically unstable, and its new democracy unsound. It is essential that the US policy promotes long-term socioeconomic growth in order to achieve democratic stability in the state.

Components of Economic Freedom and the Institutional Approach to Economic Growth

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Recent economics research has investigated a new series of explanations for the wide disparities in long-term economic performance across countries. This relatively new approach, contrasted with the neoclassical and geographical approaches to economic growth, uses government and economic institutions to explain differences in growth. This approach primarily employs empirical studies rather than theory, as the neoclassical growth model cannot predict the effect of institutions on growth beyond their effect on the investment rate. Since this approach is less than 30 years old, discrepancies in many areas of the research persist, and the goal of this paper is to reconcile some of these disputes. This paper reviews the literature on various areas of this institutional approach to economic growth. In addition, I use data from the World Bank, the Economic Freedom of the World Index, and Transparency International's Corruption Perceptions Index to run preliminary OLS regressions on regulation and corruption to supplement the previous research. Reviewing the literature, I find that economic freedom indexes are correlated with growth and that, within these indexes, measures of rule of law and judicial system quality are most robustly correlated with growth. In my preliminary analysis of the data, I also find that economic regulation and corruption have no discernible effect on growth. Finally, I resolve disagreements in the current debate over whether political institutions cause growth or vice versa. I argue that terminology is the primary source of discrepancy and that while economic institutions and policies affect growth, democratic government structures do not cause growth.

"Why Is There an Alligator in My Pool?" Assessing Potential Range Shifts with Sea Level Rise

Lara Mengak
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Rising sea levels precipitated by climate change threaten southeastern coasts. Models indicate a substantial loss of salt marsh habitat and a transition from current freshwater marsh to saltwater and brackish marsh habitat, which could adversely affect marsh-dependent species. We will examine the potential responses of the American Alligator *(Alligator mississippiensis)* to sea level rise along the Georgia coast. Spotlight surveys will be used to determine alligator occupancy at randomly selected locations within potential alligator habitat (defined using existing landcover maps). We will then use alligator occupancy data and current habitat features to predict where alligators will be found in the future as a result of sea level changes. Preliminary modeling indicates a slight decline in total suitable habitat area, patch size, and habitat permanence. Habitat quality, however, shows a substantial increase. The model output maps show suitable habitat moving further inland due to sea level rise. These potential range shifts may put alligators into increasing contact with humans. Alligators displaced by sea level changes may be forced into new habitats, both natural and human occupied. Additional research may allow us to determine where alligators will move, changes in habitat size due to sea level changes, and the specific

responses of people to increased contact with these predators.

Early Developement of Benzimidazole Resistant *H. contortus* within Individual Sheep

Adam Michalak
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Haemonchus contortus is a gastrointestinal haematophagic parasite which causes significant production loss and death of ruminants worldwide. Deworming drugs are administered to sequester *H. contortus*'s detrimental effects, but increasing resistance levels are rendering the drugs ineffective. However, little about the early-stage evolution of this developing resistance is understood. We hypothesize that the dynamics of the initial resistance development are significantly impacted by parasite load size and the number of anthelmintic treatments per sheep. A multiple-resistant population of *H. contortus* in the UGA sheep flock was replaced with a fully drug-susceptible population. The sheep herd was then moved to a new, parasite free, location. Sheep were treated with anthelmintics selectively based on parasite loads, and fecal samples were collected four times during the year to measure the worm-egg counts. Analysis of the fecal egg count data from 31 sheep demonstrated that the five with the highest totals contain 64.26% of the eggs, while the five with the fewest totals contain 0.52% of the eggs. The *H. contortus* eggs were then isolated from the feces for future DNA extraction and measurement of resistance-associated mutations in the beta-tubulin gene using real time PCR. Data will be analyzed to determine the impact parasite levels, treatment numbers, and sheep age have on resistance development. Results should provide a deeper understanding of factors contributing to the early-stage evolution of drug resistance in nematode parasites.

Trade-offs: The Effects of Contiguous Rivalries on International Decision-Making

Travis Miller
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When states face a trade-off between two salient conflicts, how do they choose to expend their scarce military resources? In this study, I argue that the existence of an interstate rivalry with one's neighbor compels a state to minimize the resources it commits to disputes outside the rivalry. A state will evaluate its distribution of capabilities and determine that the military threat and intense competition associated with contiguous rivalries requires the utmost attention for both offensive and defensive purposes. This is due to the opportunity for aggressive action that contiguity affords such adversaries and the willingness that rivalry pervades them with to fight over the issues inspiring the conflict. The leaders will then proceed to act more amicably in disputes of a non-contiguous, non-rivalrous distinction due to the relatively reduced saliency of such dyads. This allows the state to concentrate its resources on confronting the more primary, immediate threat – the rival state – thereby making its foreign policy more focused and efficient. I assess this argument by examining the behavior of major states over the period 1816-2001, both in conflict and negotiation. I also outline the implications of this study's conclusions in broad terms and in greater specifics as it relates to contemporary United States-China relations.

Civil Society Collaboration between the U.S., E.U., and Turkey

Kameel Mir, Foundation Fellow
Dr. Cas Mudde, International Affairs, School of Public & International Affairs

The U.S. faces a security concern regarding Turkey's accession to the E.U. Years of delay to Turkey's membership process are slowly beginning to evidence their effect on Turkish

politics. Turkish elites have stalled some of their progress towards meeting E.U. membership criteria, and in the realm of global politics, they have clashed with Israel and refuse to support further American sanctions on Iran. The Turkish populace has voiced a new aversion to joining the E.U., and Turkish public opinion of the U.S. ranks dismally low. In order to preserve the U.S.'s invaluable partnership with Turkey, the most powerful Middle Eastern democracy, the U.S. must strengthen Turkey's bond with the western sphere through substantially furthering its progress towards E.U. accession. Analyzing policy alternatives according to how they increased U.S. legitimacy through furthering Turkey's cause, political feasibility, and logistical success revealed a solution in the civil society arenas of Turkish, European, and American politics. Establishing and promoting collaboration between the leaders of the most influential CSO's in the three societies, specifically through a discussion on the place of religion in a democratic civil society, would target the crucial link between popular opinion and elite power. This alternative aims to address Islamophobia in the E.U. and U.S. and aversion to the West in Turkey, all the while assisting the progression of Turkey's democracy. As the Middle East writhes in chaos and as the U.S.'s ability to monitor the region dwindles, the timely implementation of this alternative becomes increasingly crucial.

Expression of Toll-Like Receptor-3 in Response to EHDV

Spencer Mitchell, CURO Graduation Distinction
Dr. Elizabeth Howerth, Pathology, College of Veterinary Medicine

Epizootic hemorrhagic disease (EHD) is a widespread disease affecting white-tailed deer and rarely cattle in North America. The disease is caused by epizootic hemorrhagic disease virus (EHDV), a double-stranded RNA virus in the orbivirus family that infects the endothelium lining the blood vascular system. Little is known about the innate response to infection with this virus. Toll-Like Receptors (TLRs) are proteins within a cell or on the cell surface that recognize and initiate a response to pathogen-associated molecular patterns (PAMPs). Toll-Like Receptor 3 (TLR3) is responsible for recognizing double stranded RNA (dsRNA) viruses. We hypothesize that TLR-3 plays a role in the susceptibility of deer to EHDV so the purpose of our project was to evaluate the response of TLR3 and the effect of such a response following inoculation of cow endothelial cells with EHDV. We performed a quantitative reverse-transcriptase polymerase chain reaction to evaluate changes in TLR-3 mRNA over time in cow pulmonary artery endothelial cells infected in vitro with various amounts of EHDV. We did not detect changes in the levels of TLR-3 mRNA in response to infection with EHDV. Next we will evaluate expression of NF-kB, a rapid response transcription factor that acts to produce an inflammation response in the body, which is up-regulated when ds-RNA binds to TLR-3 via immunohistochemistry. An increase in cellular NF-kB and a constituent level of TLR3 in the cell following infection might offer insight about the mechanism by which TLR3 is activated and potentially recycled following infection with EHDV.

Conformational Preferences of a Prototype Biomolecule in Liquid Helium Nanodroplets

Grant Moody, CURO Graduation Distinction
Dr. Gary Douberly, Chemistry, Franklin College of Arts & Sciences

We report the infrared action spectroscopy of a prototype dipeptide in low-temperature liquid helium nanodroplets. The molecule used for this experiment is Ac-Gly-NHMe (NAGMA). The NAGMA sample is vaporized, and the vapor is entrained in a beam of the helium nanodroplets. The

vibrational energy of the NAGMA molecules is quenched so rapidly (~1014 K/s) via energy transfer to the helium droplet that the conformational distribution in the vapor phase is frozen out upon helium solvation. Because the conformers of NAGMA cannot interconvert at the droplet temperature (0.4 K), the spectroscopy of the helium solvated NAGMA ensemble is representative of the conformational ensemble at the vapor temperature (~600 K) within the NAGMA pick-up cell. Possible conformations of this dipeptide were computed using *Gaussian03*, a quantum chemistry software package. Three local minima were identified using Density Functional Theory, and a molecular mechanics method was used to probe for additional minima on the potential energy surface. An infrared spectrum was obtained for helium solvated NAGMA in the range of 3200-3700 cm-1. Four distinct peaks were observed, signifying either bonded or free N-H stretches. These peaks are most likely due to two conformations of the NAGMA molecules, as the molecule has two separate secondary amines. Vibrational transition moment angles and permanent electric dipole moments were obtained experimentally for each of the peaks observed in the spectrum. The complete set of spectroscopic data is compared to the calculations of the various conformational minima in order to arrive at a definitive assignment of the conformations of NAGMA present in the vapor phase at ~600 K.

Occupational Complexity as a Predictor of Cognitive Reserve

Jake Moskowitz
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

The concept of cognitive reserve suggests that certain individuals possess built-up mechanisms that enable them to cope with the onset of degenerative neurological diseases better than others. This "reserve" of cognitive function is thought to be derived from a variety of demographic factors, including but not limited to occupational and educational attainment, race, gender, and age. The Wechsler Test of Adult Reading (WTAR) has proven to be a valid proxy for cognitive reserve in older adults, successfully predicting premorbid IQ in patients with minimal to mild Alzheimer's disease. WTAR scores have been shown to be heavily predicted by several demographic variables, including education, occupation, age, gender, race, and region of residence. The relative importance of occupational data to predicting WTAR scores, however, remains a point of some disagreement among researchers. This study seeks to determine the significance of occupational complexity toward predicting the WTAR values of a local older-adult population. Demographic data containing educational and occupational attainment, age, and gender were compared against participants' WTAR scores. When analyzed using a hierarchical regression model, occupational complexity was found to significantly predict WTAR scores, even when education, gender, and age were controlled for. This finding supports the notion that long-term occupational complexity contributes to cognitive reserve throughout one's life. While further research is needed, this link between occupation and cognitive reserve could contain valuable implications for the public health struggle against the rising global epidemic of neurological degenerative disorders such as Alzheimer's disease.

Stepping into Masculinity: The Dress and Body Modification of African American Fraternities

Amy Moulton
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The cultural and sartorial practices of National Pan-Hellenic Council (NPHC) fraternity members play a key role in constructing the desired masculinity of the

fraternity men. The most obvious of these practices are the members' emphasis on particular sartorial styles during step performances and the body modifications—especially brandings—they routinely adorn their bodies with. Through my research and personal communication with NPHC members I have discovered that large-size brands are most coveted among Black Greek step performers because they require proportionally large arms that can be attained only through a grueling physical exercise regimen. Large brands that showcase strength and represent pain endurance are rights of passages for NPHC members to enter into manhood and gain acceptance into their close-knit subcultural group. Through the analysis of the dress, body modifications, and culture of the NPHC fraternities, one can discover how NPHC fraternities foster their members' perception of ideal masculinity. NPHC fraternities' step performances aid in mapping out and constructing the desired masculinity of African American men through the use of erotic costumes, suggestive chants, and sexualized dance moves that create an aura of heightened sexuality. The steppers' muscular and branded bodies suggest a relationship between physical strength, pain tolerance, machismo, and African American Greek life.

Story-gathering and Community Performance

William Murdock, Jr.
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

As the 20th Anniversary playwright for *Swamp Gravy*, Georgia's official folk-life play, I collected stories from the community of Colquitt, GA, and used them to create a new community performance piece. Focusing specifically on one woman's story, I will detail the research process behind one scene, "Mail-Order Murderer." "Mail-Order Murderer" tells a story of intrigue, arranged marriage, false identity, premeditated murder, and criminal entrapment—all taking place within a few short days in 1961 on a sleepy, rural cattle farm in Southwest Georgia. Using findings from the Georgia Newspaper Project, I was able to reconcile the "officially reported" version of Levi L. Henter's arrest with the familial recollections of the victim's great-niece. This story offers historical significance as the rediscovery of an almost forgotten story in Georgia's history. Forensic pathologist John Coe, who worked on inquests into the assassinations of John F. Kennedy and Martin Luther King, Jr., called the Levi Henter case one of the most fascinating of his career. This information, coupled with research into Depression-era Circuses was used to create a scene for Georgia's official folk-life play.

Investigating the Indirect Effects of Guppy Introduction on Populations of a Shredding Caddisfly in Trinidadian Streams

Kelly Murray
Dr. Catherine Pringle, Odum School of Ecology

In Trinidadian streams, guppies (*Poecilia reticulata*) have naturally colonized or were introduced to regions where previously only one other fish species, the killifish *Anablepsoides hartii*, existed. A survey of macroinvertebrates in eight streams, each with paired reaches with and without guppies shows that guppy presence is associated with higher abundances of the leaf-shredding caddisfly *Phylloicus hansoni*, an important decomposer in these stream ecosystems. Reaches with long-term guppy presence exhibit the greatest differences when compared to their killifish-only reaches. Our aim is to tease apart mechanisms for these observed differences. Benthic macroinvertebrates are important resources for both fish species. We hypothesize that interference competition between introduced and native fishes will result in niche partitioning within the community. To

determine this, we are analyzing gut contents of killifish from killifish-only reaches as well as guppy+killifish reaches, which are at different time points of guppy introduction: 2-3 years, 35 years, and 100+ years. This experimental design will allow us to assess any differences in how killifish forage in response to guppy presence through time. Relative amounts of defined food categories in gut contents will be quantified and compared between reaches, especially concerning amounts of terrestrial versus aquatic insects present. We predict that guppies' benthic foraging behavior causes killifish to feed preferentially on terrestrial insects fall-in compared to benthic invertebrates, including *Phylloicus*. Because *Phylloicus* is such a prominent decomposer of allochthonous material, differential predation by killifish on this aquatic insect would be an important factor affecting rates of leaf breakdown in these streams.

Three Dimensional Cell Based Assay Standard for Pharmaceutical Testing

Rebekah Myrick
Dr. William Kisaalita, College of Engineering

Present 3-D cell cultures for pre-clinical screening of pharmaceuticals lack a standard to validate their emulation of cells *in vivo*. Therefore, 3-D cultures reduce the use of humans and animals in the pharmaceutical industry, but the challenge to optimize the cultures make this innovation less cost efficient. This research investigates complex physiological relevance (CPR). CPR will confirm the formation of cell cultures that mimic corporeal arrangement and performance. In these experiments, the cell densities that yield optimal CPR in HEP-G2 hanging drop experiments were determined. Next, the materialization of cell cultivations resembling liver hepatocellular carcinoma cells (HEP-G2) will be validated by measuring albumin production (performance) and visualizing canaliculi formation (arrangement) with transmission electron microscopy and confocal microscopy. The resulting procedures will substantiate CPR of 3-D cell cultures and reduce costs in the pharmaceutical industry.

Characterizing a Novel Intragenic RpoN-dependent Promoter in Salmonella

Kiana Nezafat
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Transcription initiation in bacteria is mediated by RNA polymerase in the presence of a sigma factor. There are two main families of sigma factors, sigma 54 (RpoN) and sigma 70 (RpoD). The mechanism by which RpoN directs the initiation of transcription by RNA polymerase is different from the RpoD-related sigma factors. *Salmonella enterica* subspecies *enterica serovar Typhimurium* (*S. Typhimurium*) has been a model organism for studies of bacterial gene regulation and is an excellent system in which to characterize the RpoN-dependent regulon. Our lab has identified several potential RpoN-dependent promoters in *S.* Typhimurium strains LT2 and 14028 in the presence of a universal activator of RpoN-dependent transcription, DctD AAA+, using microarrays and chromatin immunoprecipitation coupled to DNA microarray (ChIP-chip). A point mutation in the start codon of a secondary sigma factor in LT2 results in a less complex pool of sigma factors as compared to 14028s. One hypothetical RpoN-dependent promoter that was identified in LT2 is a potential intragenic promoter controlling the expression of a *cas1*-like gene in a CRISPR-CAS System. Although there are no differences in the hypothetical promoter sequences between the two *Salmonella* strains, we did not see strong activation from this promoter in the microarrays with 14028s, despite strong ChIP-chip evidence of RpoN binding in both strains. The work presented in this poster seeks to characterize this hypothetical RpoN-dependent promoter and its activation in 14028s using 5' RACE to map the

transcription start site for the RpoN-dependent *cas1* transcript and qRT-PCR to assess the transcription activity.

Vietnamese Language Attitudes, Use, and Identity: Determining a "Fobby" Vowel Quality

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In the United States, 2nd generation Vietnamese-Americans have varying levels of language proficiency and are often heritage speakers, usually never having learned Vietnamese formally. For this reason, we often see a varied array of how younger Vietnamese define their ethnic identity along the lines of language. This study will explore language attitudes, language use, and language and identity of 2nd generation Vietnamese-Americans in the Athens, GA area, particularly those attending the University of Georgia. The study will also analyze internalized racism among 2nd generation Vietnamese-Americans, examining the push towards a bi-cultural middle between "fobby" and "whitewashed" – "fresh off the boat" foreign and completely assimilated to American culture respectively. Participants will first be interviewed about their personal experiences, language fluency, and what it means to be Vietnamese. Then, participants will read sentences in English containing target vowels. After reading sentences in English, participants will engage in a picture identification activity, where they will be shown pictures of common concepts whose words contain Vietnamese target vowels. The two sets of target vowel frequencies, or formants, will be compared in order to determine if participants demonstrate any cross-linguistic influence from one language to the other. Participants will finally answer questions about what it means to be or sound foreign, or "fobby." The results of the study will provide insight on societal pressures Vietnamese-Americans may feel concerning their language proficiency and their ethnic identity while determining if there is a quantifiable foreign, or "fobby," vowel quality in certain speech patterns.

Structural Evolution of the Ca_2^+/Calmodulin Dependent Protein Kinase

Tuan Nguyen, CURO Honors Scholar, Ramsey Scholar, CURO Summer Fellow
Dr. Natarajan Kannan, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The Ca_2^+/Calmodulin Dependent Protein Kinase (CAMK) of the eukaryotic protein kinase (EPK) superfamily forms a large group of homologous protein kinase implicated in diverse cellular functions. Although past studies have provided extensive insights on the CAMKs' diverse modes of regulations, substrates, and functions, the evolutionary basis of the CAMKs' structural divergence has not been well understood. Here, we identify selective sequence constraints unique to the CAMKs and its family members via a Bayesian approach. Our analysis of CAMK specific constraints reveal a contiguous network of co-conserved residues that physically link the EPK specific hydrophobic network to distal sites along G-H-I domain (CAMK Network) and a distinctive H-helix N-terminal capping motif. We found a conserved insert segment unique to many of the CAMKs that are structurally coupled to the EPK core via layers of co-conserved residues. Many family-specific constraints and variations reveal features building upon the CAMK Network. Further analysis points to convergent mode of CAMK-like structural motif across sparse families across the kinome. We thus propose that the CAMK core form an allosteric module that can mold the dynamics of the C-lobe to exert control of catalytic activity. Our analysis provides avenues to elucidate allosteric regulatory mechanism unique to the CAMKs, aiding the drug discovery efforts and building a

framework to study other cell signaling systems.

Dormant: A Photographic Series

Michelle Norris
Prof. Marni Shindelman, Lamar Dodd School of Art, Franklin College of Arts& Sciences

Dormant is a series of images that investigate the action of watching the television. Each image portrays a human that is vacant, in addition to the pixelated image of that which they are watching. This concept grew out of my interest in television culture, the uncommonly seen state of its viewing, and the film *Evidence* by Godfrey Reggio, in which children are filmed while viewing TV. My subjects would watch their favorite television show or movie as they were photographed. The photos were produced with a digital camera combining the glowing light from laptops, televisions, and colored light bulbs. The series reveals an alien and submissive human state that is evoked when these subjects mentally check out and live vicariously through programming. This work is important for continuing the research of other artists who are interested in investigating the physiological aspects of this common activity, as well as the consequences to follow.

Removing Barriers to Vision Services for School Children

John-Jordan Nunnery
Dr. Neale Chumbler, Health Policy & Management, College of Public Health

Barriers between students and vision services have a negative impact on student performance both inside and outside of the classroom. An estimated one in every five US school children has an undiagnosed vision problem, a burden that disproportionately affects low-income and minority students. Elementary school students with uncorrected hyperopia earned perceptibly lower achievement scores in one British study, while another study conducted in New York found correlation between students' performance on vision tests and percentile of grades earned. While these findings do not imply direct causation, the role that poor vision plays in a student's sub-par performance cannot be denied. The social impact of poor vision has also been documented. One Baltimore study found that a vast majority of juvenile delinquents screened failed vision tests. School implemented vision screenings are not improving eyesight in the classroom. In one study, roughly only a quarter of at-risk students received follow-up care after failing school vision exams. Barriers to follow-up care are logistical (difficulty scheduling appointments), financial (no insurance), and social (parents with disabilities) in nature. A thorough literature review was conducted to develop three policy alternatives. The policy proposals were evaluated by a cost-benefit analysis, the degree to which the policy would increase access to vision services, and feasibility. From this analysis, the policy alternative that calls for state funding for a mobile vision clinic program was chosen. This program would be managed by a non-profit organization, similar to the mobile vision clinics found in Florida and California.

Classification of Protein-ligand Interactions of P-glycoprotein

Phillip Ogea, CURO Summer Fellow
Dr. Arthur Roberts, Pharmaceutical & Biomedical Science, College of Pharmacy

P-glycoprotein (P-gp) is a transport protein found in the membrane of mammalian cells that plays an active role in the efflux of drugs and toxins. While P-gp protects cells from natural toxins, it also hinders metabolism of modern pharmaceuticals by preventing them from entering target cells. P-glycoprotein is well documented for its wide substrate promiscuity; it transports a wide variety of drugs with varying structure and function, contributing to what is known as multiple-drug resistance. P-glycoprotein was

discovered in 1976, yet scientists still do not fully understand the nature of its protein-ligand interactions. A clear knowledge of these interactions is vital to classifying the activity of P-glycoprotein. This project has used various methods, mainly nuclear magnetic resonance (NMR) spectroscopy, to collect data on P-gp's interactions with several ligands. This data can be matched with computer-simulated models of binding to create testable hypotheses on the location of binding sites. Additionally, activity assays can be paired with spectroscopic data to examine the rates and kinetics of drug transport. A collection of data on protein-ligand interactions, based on a variety of substrates, should establish trends that can better define the activity of P-glycoprotein. If the binding interactions of P-glycoprotein were elucidated, its contribution to multiple-drug resistance could potentially be circumvented. With this knowledge, drug developers will be able to produce more effective medicine for patients.

An Assessment of Neutrophil Enrichment by Single Step Differential Density Separation

Batare Okivie
Dr. David Hurley, Large Animal Medicine, College of Veterinary Medicine

Neutrophils are used as an indicator of innate immune function. A simple method is used to enrich the neutrophil population from blood. The purpose of a study in our lab is to assess the function of an oral immunestimulant, using neutrophil function as a monitor of innate immunity. During these studies, the purity of the enriched neutrophil population was questioned. My study assesses the enriched neutrophil population using microscopic differential leukocyte counting and compares these finding with the differential leukocyte distribution of these cells by flow cytometry. Our hypothesis was that the enrichment of leukocytes collected from blood using a single step density gradient of 1.077 gm/ml would yield at least 70% of neutrophils. The neutrophil fraction was collected, and slides were prepared using a cytocentrifuge. The slides were stained with a commercial Wright's stain kit. A classical differential count (neutrophils monocytes, and lymphocytes) was done using a compound microscope by counting at least 200 cells per slide. These results were compared to the "leukogram" generated from a forward angle and side scatter assessment of the cells using a cytometer and analysis software. A comparison of the correlation between the microscopic distribution of leukocytes and that from flow cytometry will be assessed. To date, it appears that samples taken 30 and 60 days pre-delivery and those taken 30 days after delivery were consistently enriched in neutrophils. Samples collected 1, 7 and 14 days after delivery contained a smaller fraction of neutrophils.

Transmission Strategies of *Trypanosoma cruzi* in Wild Reservoir Hosts

Ronke Olowojesiku, CURO Summer Fellow
Dr. Nicole Gottdenker, Pathology, College of Veterinary Medicine

Trypanosoma cruzi is the cause of Chagas disease, a zoonotic vector-borne protozoan parasite affecting approximately 10 million people worldwide. Better understanding the means through which *T. cruzi* is transmitted to animal hosts will contribute to strategies aimed at reducing the number of *T.cruzi* infections in humans. The objective of this study is to describe factors influencing T. cruzi infection in the common opossum (*Didelphis marsupialis*), a key reservoir for Chagas disease in Panama. Based on previous studies, it was expected that *T. cruzi* would be detected at higher levels in the scent glands than in the blood of the opossum. Samples were collected from the blood and scent glands of opossums trapped around the Panama Canal. PCR tests showed a higher detection of *T. cruzi* in the scent glands (6 positive/15 tested) as compared to the blood (1 positive/15 tested). Additionally, ecological

factors affecting transmission were evaluated. Because the palm *Attalea butyracea* is a known habitat for the Chagas disease vector, we hypothesized that there would be more *T. cruzi* infection in the opossums from a densely populated *A. butyracea* region. The study results supported the hypothesis, but more data is needed. I discuss findings from this preliminary study in relation to their significance for *T. cruzi* infection dynamics.

Analysis of P1 Function in *Mycoplasma pneumoniae* Adherence and Gliding

Babajide Oluwadare, CURO Honors Scholar, CURO Summer Fellow
Dr. Duncan Krause, Microbiology, Franklin College of Arts & Sciences

Mycoplasmas are small bacteria having a minimal genome and no cell wall. This study focuses on *Mycoplasma pneumoniae*, a human pathogen causing bronchitis and primary atypical "walking" pneumonia. Despite its small genome *M. pneumoniae* has a complex, differentiated polar structure called the terminal organelle. The terminal organelle initiates mycoplasma binding to receptors on respiratory epithelium and is the motor for gliding motility. Located on the terminal organelle surface is the P1 protein, which functions directly in both cell adherence and motility. There is evidence from recent studies to indicate that P1 repeatedly catches and releases sialic acids, present on animal cell surfaces, to thrust the mycoplasma cell forward. Furthermore, P1 is believed to exist in conformationally distinct subpopulations that shift when mycoplasma cells glide. Little is known about the specific mechanism by which the bacterium exhibits motility through the P1 protein. Learning about this unique form of movement can lead to new strategies for treatment of infections and a greater understanding of bacterial motility. By means of immunofluorescence microscopy with monoclonal antibodies specific for P1, mAB1 and mAB2, we sought to define quantitatively the location and relative amounts of P1 subpopulations. The antibodies mAB1 and mAB2 consistently yielded distinct labeling patterns which were not the result of background or "noise." Furthermore, mAB1 appeared to bind only to a subset of P1 proteins and only at specific times, as opposed to mAB2, which appeared to bind to all P1 at all times.

Finite-difference Time-domain Investigations of Metamaterials

Elliot Outland, CURO Honors Scholar, CURO Summer Fellow
Dr. William Dennis, Physics and Astronomy, Franklin College of Arts & Sciences

Metamaterials, artificially engineered materials possessing properties not normally found in nature, have a variety of applications in a number of fields. In order to put these materials to their best uses, it is necessary to understand how and why they work as they do. The finite-difference time-domain (FDTD) method is one way of achieving such understanding; by solving electromagnetic equations at different time-steps, one can gain information about the way that waves interact with the material in question at a future time-step. This new information can then be used to understand the interactions at a third time-step, and so on. Our research uses the MIT Electromagnetic Equation Program (MEEP) to perform FDTD analysis on the behavior of electromagnetic waves as they propagate through various materials in different configurations. After we specify the parameters of and run the simulation, MEEP produces an output file from which we can obtain numerical and quantitative data about the light-material interaction. Through this analysis, we can gain a better understanding of what properties produce what results; this will aid in the designing of metamaterials to better fulfill specific functions.

Abstracts

Characterization of the Light Signaling System in Fireflies

Jennifer Pallansch
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The universal nature of communication systems makes an understanding of their evolution a central question in biology. In the vast majority of species, the molecules underlying signal production and reception are usually unknown or complex, which makes an understanding of their evolution essentially intractable. In fireflies, however, light signal production is controlled by a single enzyme, luciferase, which acts by oxidizing its substrate, luciferin. My project fills in two gaps in our knowledge of firefly light production. First, the nature of the variation in luciferase genes between and among species was elucidated by recording emission spectra from fireflies in the *Photinus* genus using a portable spectrometer. These individuals were collected, and their identity was confirmed both molecularly and morphologically. This data was coupled with recorded activity times and background vegetation to compare two factors cited as possible influences on the evolution of light production, and this information will be supplemented by additional collections this summer. The second part of my project investigates the hypothesis that the luciferase enzyme is the sole determinant of light color variation. Luciferase genes will be sequenced across species to be cloned into a vector and expressed in *E. coli*. In this way, emission spectra that are the product of the luciferase gene alone can be measured with a portable spectrometer. By combining the *in vivo* and *in vitro* spectrum comparisons and field data, my work will contribute to a complete understanding of the evolution of a signal in a communication system.

Leading from Behind: A Progressive Outlook on U.S.-North Korean Relations

Jinny Park
Dr. Brock Tessman, International Affairs, School of Public & International Affairs

The Democratic People's Republic of Korea (DPRK) is notorious for its opaque foreign policy process and fickle approach to international diplomacy. For its part, the United States and its allies have focused on hard power tools such as economic sanctions and military posturing in their attempt to force the DPRK to abandon its nuclear weapons program. But there are important considerations that are being missed with the current foreign policy strategy employed by the United States. This paper addresses U.S. foreign policy towards the DPRK from a perspective other than that of scrutiny and disdain, and aims to outline what steps the United States should take to alleviate the current strained relationship. Numerous U.S. policy briefs, agency reports, and case studies of intervention from the late 1990s to the current era are used in support of my argument that using soft power and engagement policies will provide better policy results for the United States. In particular, I suggest that the United States has recently adopted a more supportive (rather than leadership) role with respect to international policy regarding Iran and Libya. Using a similar diplomatic approach, the United States can play a supporting role to China, which enjoys much greater leverage over the DPRK. Proposed alternatives are measured in the criteria of political feasibility, social equity, and effectiveness. Ultimately, the United States will have a better chance at building a working relationship not only with the DPRK but also with China, and spread its national interests of global peace, stability, and non-proliferation.

Abstracts

Understanding the "Gap" Effect in the Generation of Express Saccades

David Parker, CURO Summer Fellow
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

A saccade is a rapid re-fixation of gaze that can be elicited in experimental settings by having an individual fixate on a center point and then introducing a peripheral target. Previous studies have shown that when a brief "gap" period is introduced following the disappearance of a fixation point before the appearance of the peripheral target, it produces a significant portion of "express saccades" that are 40-50% faster than normal saccades. The highest proportion occur when the "gap" period is 200 ms. This experiment examines why a 200 ms "gap" period produces the highest proportion of express saccades, which will give key insights into how saccades are generated. In order to investigate this question, two groups of 15 subjects were formed; one consisted of a blocked interval group and one interleaved interval group. The blocked group performed 5 sets of 300 saccade trials, with each set having the same "gap" interval (0, 100, 200, 300, and 400 ms). The interleaved group performed 5 sets of 300 saccade trials with random "gap" intervals. Behavioral data indicated that only for the blocked group did a 200 ms "gap" period elicit the highest proportion of express saccades. This suggests that top-down cognitive processes involving expectation influence the production of express saccades. Future analysis of distribution statistics of the psychophysiological data will attempt to shed light on why the 200 ms "gap" period effect is only observed during the blocked condition. By investigating the mechanisms of saccade generation this experiment can give vital insights into the ocular motor system and top-down cognitive control processes.

Children's Emotional Awareness: Relations to Emotion Regulation and Coping in Middle Childhood

Heather Patterson
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

Emotion regulation includes the processes involved in coordinating the intensity, frequency, and expression of emotions (Morris, Silk, Steinberg, Myers & Robinson, 2007). Children's ability to effectively regulate their emotions has important implications throughout their lifetime. In clinical populations, individuals with psychological disorders tend to modulate their emotions relatively poorly and children who do not develop early emotion regulation skills may have an increased risk for later psychopathology (Cole, Michel & Teti, 1994). The current study examines how children's awareness of their emotions relates to child emotion regulation. A racially diverse sample of 27 children (ages 6-12) was recruited as part of an intervention pilot study. Children completed the Meta-Emotion Interview (Katz & Gottman, 1986), a semi-structured interview including dimensions of the child's emotional awareness and dysregulation, as well as remediation strategies used to cope with emotions, specifically anger and sadness. It was hypothesized that children scoring higher on awareness would have lower dysregulation and higher remediation scores. Results supported hypotheses with moderate effects sizes, although the small sample size prevented correlations from reaching statistical significance. For sadness, awareness was associated with lower dysregulation (r = -.32) and higher remediation (r = .36). Similar relations were found for anger awareness with lower dysregulation (r = -.26) and higher remediation (r = .21). Interestingly, there was a significant positive correlation between dysregulation and remediation for anger (r = .39), but not sadness. Future analyses will incorporate other reports of children's

emotion dysregulation and behavior as they relate to children's own emotional awareness.

Lipid Association Improves Hemoglobin-binding Capacity by Haptoglobin Related Protein

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

Haptoglobin related protein (Hpr) is a component of a minor subclass of human high density lipoproteins (HDLs) called trypanosome lytic factors that function in innate immunity against *Trypanosoma brucei brucei*. Hpr is >90% identical to the soluble serum protein haptoglobin (Hp); the major difference being the presence of a hydrophobic signal peptide in Hpr. This signal peptide mediates association of Hpr with HDL. Because purified Hpr does not bind Hb, it was hypothesized that the delipidated signal peptide interferes with Hb-binding. This hypothesis was tested using fluorescence spectroscopy. Hpr contains tryptophan residues that fluoresce, and as Hb binds to Hpr, the tryptophan residues are quenched and the relative fluorescence decreases. This change in the relative fluorescence was measured for Hb titrated into native Hpr alone, a recombinant form of Hpr which lacks the signal peptide, and native Hpr in a lipid environment. The lipid environments tested included high-density lipoproteins (HDLs) and 1-Palmitoyl-2-oleoylphosphatidylcholine (POPC) liposomes at two different concentrations. Recombinant Hpr and lipid-associated native Hpr showed Hb-binding capacity, and Hb-binding increases with higher concentration of lipids. This suggests that when the signal peptide on the native Hpr protein is delipidated, Hb-binding is inhibited and Hb-binding capacity is rescued in a lipid environment. These results have important implications for understanding the trypanosome lytic factors, which contain Hpr and require the binding of Hb for uptake into the trypanosome and killing of the parasite.

Increasing Access to Specialty Services in Community Health Centers: Policy Alternatives and Implications for Minority Communities

Emily Peng, Ramsey Scholar
Dr. Toni Miles, Gerontology, College of Public Health

Community health centers (CHCs) are federally-funded clinics that provide primary outpatient care to the country's most vulnerable communities. Because a significant portion of their patients are uninsured, insured by Medicaid, or from a racial or ethnic minority, CHCs play an important role in reducing health disparities. Despite their success in providing comprehensive preventive and primary services, CHCs are limited in their provision of specialty care. In a survey conducted by the Commonwealth Fund in 2008, 71% of 800 surveyed CHCs struggled to provide specialty services for patients insured by Medicaid, and 91% of the same centers reported difficulty in arranging specialty services for their uninsured patients. Barred access to necessary specialty services for a large segment of the population already suffering from health disparities holds drastic socioeconomic consequences. These include decreased workforce productivity and the overcrowding of emergency rooms. The current method of specialty care coordination where CHC providers use personal networks to solicit charity services is unsustainable. These informal referral networks require labor-intensive coordination and are extremely sensitive to economic recessions. Through extensive literature review and policy analysis, this paper proposes a two-pronged alternative to increasing access to specialty care in CHCs. CHCs located in remote areas without access to public hospitals should hire specialists on site, and those located in communities with public health infrastructure should engage in partnership contracts to

share resources. By increasing access to specialty care, CHCs can not only improve patient outcomes but also reduce the socioeconomic consequences of health disparities in the United States.

The Fever for Progress: Yellow Fever in 19th and 20th Century Havana and Savannah

Rachel Pérez, CURO Honors Scholar, CURO Graduation Distinction
Dr. Reinaldo Román, History, Franklin College of Arts & Sciences

Yellow fever outbreaks in late 19th century Havana, Cuba and Savannah, Georgia provide effective backdrops for examining the divergence of folk and professional healing. The epidemics both affected and reflected the demotion of certain religious and folk institutions to the status of outdated entities and concurrent elevation of biomedical science as a more modern and, therefore, superior mode of interpretation. These shifting attitudes are seen in the standardization of medicine, refinement of biomedical rhetoric, and labeling of religious folk healing practices as archaic superstitions. Besides yellow fever outbreaks, Havana and Savannah both experienced costly independence wars, reliance on the shipping industry, and considerable Catholic influence. The U.S. Federal Government did little to rectify the situation in post-epidemic Savannah, but seized on the Havana outbreaks as a means of demonstrating U.S. superiority and proving the necessity of intervention in order to bring modernity to the island. In both cases, civic institutions like the Catholic Church, the Savannah Benevolent Association, and *clínicas mutualistas* played significant roles in addressing the epidemics, particularly when governmental response was inadequate. These institutions faced the challenge of maintaining certain principles without appearing obsolete impediments to progress. This project deploys primary sources drawn from the archives of the Savannah Benevolent Association, the Catholic Church, 19th century medical literature, and military and government reports to offer a comparative account of the American "sanitation empire" from the 1870s to 1900s. The analysis reveals the role of religious and other non-state actors in modernization campaigns that are usually credited to the state.

Embodied Energy Requirements for Meat Calorie Versus Non-meat Calorie Production: A Comparative Study of Nine Countries

Miriam Perryman
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Energy return on energy investment (EROI) analyses have been performed on various societal and biological processes since the 1970s to evaluate energy efficiencies. If the system requires more energy to build or operate than it eventually returns, it is either inefficient or will soon cease to exist. This emerging method of analysis has been particularly useful in evaluating the efficiency of human food systems (e.g., energy invested versus dietary calories (Calories) produced). Given that upstream energy inputs (i.e., embodied energy) for meat and non-meat food products are very different (meat typically requires significantly more energy to produce), we propose a modified ratio of the embodied energies required to produce a society's meat versus non-meat food products. This would serve as a modern metric with expanded capabilities of quantifying a society's energetic efficiencies, its potential affluence, and overall nutritional quality of its diet. We either calculated the EROI of food systems or used existing EROI studies, along with additional data, to calculate meat to non-meat embodied energy investment ratios in nine countries. This value was plotted against each country's physiologic density (arable land per person), percent meat in diet, and annual Gross Domestic Product (GDP), thus providing quantified geographic,

social, and economic measures of that country's food supply system. We reveal that there is a notable correlation between this new metric and the other three measures studied. This may be significant as an additional application for EROI studies of food systems as a gauge of the overall status of a country.

Traditional and Environmental DNA Detection of a Rare Amphibian

Todd Pierson, Foundation Fellow
Dr. John Maerz, School of Forestry & Natural Resources

Much conservation attention has been directed towards the amphibian declines of the last several decades, but biologists wishing to study these amphibians are often faced with the difficulty of low detection rates. The Patch-nosed Salamander (*Urspelerpes brucei*) was discovered in Georgia in 2007 and is still found in just a dozen streams across a 7 km2 area. In order to develop a plan for the management of this species, we used leaf-litter traps to quantify the detect rate and understand fine-scale occupancy of *Urspelerpes* across its small range and additionally recorded data on all sympatric salamander species. *Urspelerpes* was found to have a stream-level detection rate of just .0476; when compared with the detection rates of sympatric salamanders (e.g. *Desmognathus quadramaculatus* at .9524), it is evident that *Urspelerpes* has a relatively low detection rate which is capable of hindering monitoring efforts. Motivated by these findings, we pursued an alternative means and developed an 'environmental DNA' assay—a relatively new method which allows for the detection of an animal indirectly through the detection of its DNA in the environment—to attempt to more effectively detect *Urspelerpes*. Here, we present the results of the leaf-litter trapping experiment and preliminary results of the environmental DNA sampling, and we compare and contrast the efficacy of these two methods. The results of this study have implications beyond the conservation of *Urspelerpes* and will be used for the further development of environmental DNA studies with other aquatic Appalachian salamanders.

Examining the Rates of Development of Manipulation and Nut Cracking Skills in Juvenile Bearded Capuchin Monkeys

Anakela Popp, CURO Summer Fellow
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Bearded capuchins, *Sapajus libidinosus*, crack nuts using stone tools. Juveniles are not taught to crack. Instead, they observe adults cracking and practice manipulation and percussion of nuts and other objects for several years. We were interested in whether the rates at which young monkeys manipulated nuts changed as they got older. We collected data on a wild group of bearded capuchins (N = 20) in Piauí, Brazil. For 10 juveniles, we cataloged the behavior of each juvenile and its neighbors for multiple 20 minute observation periods during June – July in 2011 and 2012. In this report, we focused on three behaviors: manipulation of nuts and shells, all percussive activity, and striking a nut with a stone. We analyzed the difference in rates from 2011-2012 for these behaviors when one or more of the focal monkey's neighbors were cracking nuts, and when no neighbor was cracking. We found no consistent directional change for these variables, but large changes across years for the four older monkeys (from 3.5 to 4.5 years or older) for all manipulation, and large increases in percussion for the 3 youngest monkeys (from .5 to 1.5 years), especially when no others were active. Overall, these results show no significant change in rates of percussive and striking behavior from 2011 to 2012 except for the youngest monkeys, and group activity did not alter the pattern. It appears that social context does not consistently affect the magnitude of the change in the component behaviors.

Abstracts

The Few. The Proud. The Marines.

Alexandra Prather
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This paper explores the history, meaning, cultural significance, and material properties of the Marine Corps dress uniform. My research was conducted through academic books and journals, miscellaneous references, and an interview with a Marine Corps officer. My research demonstrates the importance of understanding each part of the Marine Corps uniform as well as explaining the culture and historically rich meanings that each detail represents. My study also shows what type of person is qualified to wear the Marine Corps uniform. I discuss the rigor of the process and competition required to become part of the highly selective Marine Corps. From my research I have concluded the true meaning and significance of being a Marine soldier and how wearing the uniform influences their personal and professional lives. Each detail of the uniform represents a part of the Corps' 237-year-old history. The United States Marines not only proudly fight and work for worldwide freedom, but also make a strong effort to honor all fallen Marines that came before them. An example of this is the 'blood stripe' down the pant leg of officers' uniforms, which represents the Marines before them. A better understanding of the Marine Corps culture as well as their perfectly tailored uniforms is a way, especially for American citizens, to have a greater sense of respect and pride for all that the uniform symbolizes and represents and what these service members do for the country.

"Is Black So Base a Hue?" An Examination of Aaron and Racial Dynamics in *Titus Andronicus*

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Since the seventeenth century, critics have denigrated Shakespeare's *Titus Andronicus* for its excessive violence, both physical and linguistic, so much so that in 1687 Edward Ravenscroft decided to adapt the play into a much tamer version that superseded Shakespeare's in performance for over a century. Amid critics' ever-present discussion of the atrocities of the play, however, the more important issue of race is often overlooked; in the character of Aaron the Moor, the play's main antagonist, Shakespeare presents a racial Other who revels in his Other-ness, allowing for a variety of interpretations in performance. As such, Aaron serves as the focal point of my research, an instrument and exemplar of racial relations. After searching the play's production history, I narrowed my scope to three stagings of special interest: Ira Aldridge's 1849 rewrite, Dieter Reible's 1970 Cape Town production (in which a white actor plays the role of Aaron), and Gregory Doran's 1995 *Titus Andronicus* in Johannesburg. Examining first-person accounts of specific performances and production notes from people involved in the creative process—particularly in regards to the portrayal of Aaron and his race as compared to others around him—revealed three radically different interpretations. These interpretations range from Aaron as protagonist to a focus on absolute segregation to a somewhat unclear reflection on the arbitrary nature of race. Nonetheless, all three hold a message for the societies in which they were performed, ultimately pointing to the artifice of racial division and questioning such social constructs in three separate cultures.

Abstracts

Discover Life Mothing Project

Cameron Prybol, CURO Summer Fellow
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Weather patterns and seasonal cycles are known to play major roles in insect development and regulation, although there is little data to understand how various climate shifts may affect species populations. Lepidoptera are an incredibly diverse taxon, with 165,000 known species and an estimated 100,000 species yet to be described. They are also easy to work with, as they are harmless, attracted to lights, and readily identifiable from photographs. Study sites have been established in Athens, GA and Monteverde de San Luis, Costa Rica to sample Lepidoptera populations on a nightly basis. The Athens site, established in Spring 2010, has collected 87,404 data points to date, 66,650 of which have been identified to 856 species. The Costa Rica site, established in May 2012, has collected 49,858 data points to date, 20,822 of which have been identified to 606 species. Nightly data is collected by photographically documenting each specimen present at each study site. Photos are uploaded to the DiscoverLife database and identified to species, providing safe, efficient, and reliable data storage and analysis. Data is compared to local weather station readings and evaluated across years to show species distribution, relative abundance, phenology, and voltinism. These sites are providing insight into how weather patterns affect species in both temperate 4-season climates and tropical dry/rainy-season climates. Understanding the intricate behavior of insect life cycles holds tremendous implications for agriculture (pest insects), public health (disease vectors), and conservation (population health).

Extending Genetic Methods to Members of the Genus *Caldicellulosiruptor*: Use for Metabolic Engineering Biofuel Production from Biomass

Alyse Ragauskas
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Members of the bacterial genus *Caldicellulosirptor* are thermophilic anaerobes that grow optimally at 78°C and are the most thermophilc cellulolytic organisms known. Members of this genus vary in their ability to use different types of unpretreated lignocellulosic biomass and have the potential to produce biofuels and chemicals directly from plants like switchgrass and populus. Our lab recently reported the first methods for genetic manipulation of *C. bescii* and here we report methods for extending those genetic methods to other members of the genus. We have isolated a spontaneous deletion of the *pyrF* gene in *C. hydrothermalis* allowing genetic selection of transformants and engineering of this strain. We generated the mutant by growth at four different temperatures 55°C, 60°C, 68°C, and 75°C and after growing the cells to the same density, the cells were plated on uracil (required for a *pyrF* deletion) + 5-FOA that selects against the wild type copy of *pyrF*. The mutants are 5-FOA resistant and uracil auxotrophs allowing selection and counter selection of the wild type *pyrF* gene. PCR was used to screen mutant colonies for deletions and we identified one with a 100bp deletion. We will use a plasmid vector containing the wild-type *C.bescii pyrF* gene to establish transformation protocols for *C. hydrothermalis*. This strain has some advantages for metabolic engineering for ethanol production and our ability to genetically manipulate this strain will allow us to investigate its use for biofuel production.

Abstracts

Democratic Peace Theory-An Accurate View or Team Alliance

Nicholas Ramos-Franklin
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Democratic Peace Theory is a prominent aspect of International Relations claiming that democratic states do not engage in interstate warfare. The theory is furthered by scholars such as Francis Fukuyama and Immanuel Kant who state that democracy is the highest level of political development, that eventually states will converge on this government type, and that world peace will be extant. This paper will attempt to determine if this theory is relevant only with democracies, or if there is empirical evidence supporting a Communist or Socialist Peace Theory. The paper also attempts to test the Democratic Peace Theory by focusing on alliance politics and more specifically the idea that democratic governments face a common ideological enemy in communist and socialist states. The paper will explore this topic by case study analysis of interstate warfare in the last 80 years. The paper also will compare and contrast warfare between states with the same government type and create a statistical analysis of the occurrence of war between states with the same form of government. This paper is important because it introduces the viability of peace theories in various government forms and poses the possibility that democratic peace depends on the alliance against competing forms of government. Finally, the paper raises the question that, if all states were democratic, would conflict arise for other reasons because there is no longer a common enemy in government types?

Algae Biomass Production Using Compost Leachate Water and Evaluation of Biomass Harvesting Techniques

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Algae-derived biofuels, possible alternatives to fossil fuels, are presently too costly for widespread use. Costs associated with algae production and harvesting have to be minimized for algae biofuels to be economically viable. Waste-water sources can be rich in nutrients and easy to obtain, and are therefore a desirable alternative to constructed media for algae growth. Additionally, filtering collection methods could potentially lower the costs of harvesting. A local leachate-pond provided sufficient nutrients for algal growth, and indigenous algae strains were explored for growth potential. Pond growth was monitored by daily optical density and total suspended solids (TSS) tests. The leachate water and its algal community only provided substantial biomass when regularly supplemented with conventional green algae species. Prepared filtration collection systems showed mixed benefits over the centrifuge. Incidental herbivorous organisms (rotifers*, chironomid larvae*) had a detrimental effect on growth. The leachate water and its indigenous alga community could not provide the desired biomass on its own. Further work with filter harvesting could support using filter systems at certain production scales. Problems with microherbivores reflect problems faced in algeaculture worldwide with antagonistic organisms.

Identifying Possible Roles for Structural Proteins in Thymus Morphogenesis

Krista Ritchie
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Foxn1 positive thymus and Gcm2 positive parathyroid originate from third pouch endoderm. While it is known that this endoderm first resembles columnar epithelium, tissue structure changes as the thymus and parathyroid undergo morphogenesis, and little is known about how structural proteins are involved in these changes. My preliminary work shows that Z0-2 and Integrin beta-2 are present in the thymus. By observing changes in these

proteins, possible roles have been identified throughout thymus development. My results show that Integrin beta-2, a cell-surface protein, may have specific functions in TECs at later stages, which suggests that the protein could be required for cell adhesion during T-cell differentiation and/or thymocyte migration. Z0-2 is a structural protein found in epithelial cell junctions. By co-staining Z0-2 with a variety of cell markers, it can be concluded that the prenatal structure changes from cell clusters to a postnatal vasculature-type structure. In the present study, data has been collected to determine the presence of both Integrin beta-2 and Z0-2 in TECs, thymocytes, vasculature, or cell subpopulations of the thymus in order to support the working hypothesis that these structural proteins have specific roles during thymus development.

Melt Inclusion Study of the East Fork Rhyolite Member of the Valles Caldera, New Mexico

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Volcanic eruptions are a major societal threat in the western US, as well as around the world. The study of magmatic melt inclusions trapped in igneous crystals can record the events that trigger explosive eruptions, such as mixing of mafic and felsic magmas. Valles Caldera, NM was the site of a catastrophic eruption at 1.14 Ma, followed by eruption of the East Fork Rhyolite (EFR) lava domes and pumices between 55 and 40 Ka; these relatively younger eruptions may be precursors for a more catastrophic eruption. In order to determine whether magma mixing occurred in the EFR magma chamber, I analyzed the chemical composition of melt inclusions within plagioclase grains in samples taken from lavas and pumices of the EFR. Melt inclusions represent melt trapped at the time of the host grain crystallization, and evidence of two melt compositions should be preserved if magma mixing occurred. I analyzed the inclusions using the electron microprobe in the UGA Department of Geology. Melt inclusion concentrations of FeO, Al2O3, MgO, CaO, Na2O, and K2O were plotted against SiO2 and compared to the plagioclase compositions in order to preclude contamination from the host grain. Textures such as hornblende-rimmed orthopyroxene and sieve-textured feldspars are evidence of chemical disequilibrium, which can be an indicator of magma mixing. However, oxide variation diagrams for the melt inclusions do not show a clear bimodal grouping expected from the presence of two melt compositions. These geochemical data suggest that simple magma mixing was not a significant process within the EFR.

The Epistle of James: Discovering its Conception of Faith and Works and its Call for Social Justice

Adam Samples
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The Epistle of James is one of the seven Catholic Epistles in the New Testament, traditionally attributed to James the Just, the brother of Jesus. The epistle's teachings on faith and works have been among the most debated theological issues in Church history. In my research, I will look to the historical and literary context to understand the distinctive voice of James regarding faith and works, and I will also investigate his call for social justice. James' ideas regarding faith and works, his egalitarian, communistic worldview, and his idea of the "true religion" (James 1:27), I will argue, express a universal call for a reversal of traditional social constructs. It becomes clear that when one truly assesses the importance of James, it has a broader and more significant role in defining the Christian life than has often been credited to it; moreover, rather than being confined to the religious sphere, the epistle can be seen as

a valuable resource for the broader task of addressing social justice in today's world.

Chinese Foreign Direct Investment in the United States: A New Game

Aveek Sarker, CURO Honors Scholar
Dr. William Keller, Center for International Trade & Security, School of Public & International Affairs

In the past, foreign direct investments flowed predominantly from the "developed world" to the "developing world." Those flows are continuing, but China is now taking a lead role in seeking to invest in ventures around the world through mergers, acquisitions, and greenfield investments. Current trends indicate more than 1 trillion dollars in direct Chinese investment will flow worldwide by 2020, a significant share of which will be destined for advanced markets such as the United States. Chinese firms have already established operations in 35 states and across dozens of industries including energy, telecommunications, and industrial machinery, creating approximately 30,000 jobs. How the United States responds to this new reality will have enormous consequences for its own economic future and for both its business and political relationship with China in this new era of global finance. In undertaking this study, my purpose is to better understand the broader implications of increasing amounts of Chinese FDI in the United States and across the world to determine how they will affect the geopolitical balance of power in the near future. My methodology includes compiling time series data to analyze the distribution of investments by region, sector, and industry in addition to examining specific case studies and business deals to evaluate the various benefits and security risks that such incoming investments pose. By doing so, I will have contextualized the many implications of this emergent trend- one that will work to define the socio-political relationship of the world's two largest economies in the coming decades.

The Future of Lyme Disease: Virulence Determined by Climate

Scott Saunders
Dr. Andrew Park, Odum School of Ecology

How will vector-borne diseases change in the future under different climate change scenarios? Lyme borreliosis is the most prevalent vector-borne disease in North America and is caused by the bacteria *B. Burgdorferi*. The bacteria is spread and maintained in hosts by a vector, the black-legged tick, *I. Scapularis*. There are many different strains of *B. Burgdorferi* that generally employ either a 'rapidly clearing' or 'persistent' strategy when infecting hosts, and there is an existing model that simulates competition between these two phenotypes in a host population. The outcome of this competition depends on the difference in activity between the larval and nymph stages of *I. Scapularis* in a given season. This time delay is best predicted by the amplitude of the annual temperature cycle of a given region. Although previous studies have examined future distribution of ticks and host species, none have examined the future distributions of the different bacterial strains. Using climate predictions for the Southeast for the year 2050, this project connects these components and creates a map of predictions for the strain of *B. Burgdorferi* for each county. This data will be useful because only the persistent strains of bacteria are commonly associated with human Lyme disease cases. Early results show that most of the Southeast should favor bacteria with 'persistent' phenotypes, yet currently this region reports few incidences of Lyme borreliosis in humans.

Non-canonical CaaX Motifs Can Drive Protein Isoprenylation

William Saunders III, Colby Ruiz, CURO Honors Scholar
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

This study explores the possibility of longer non-canonical CaaX motifs. Based on the findings of Kho, et al. it was hypothesized that longer CaaX motifs may be biologically relevant. A thorough understanding of CaaX proteins and how they are post-translational modified is important because CaaX proteins are of significant biomedical relevance. For example, mutated Ras proteins, members of the CaaX family, are associated with 90% of pancreatic cancer, 50% of lung cancer, and 30% of all cancers in humans. This study was conducted using yeast as a model organism and the production of a-factor as a reporter to investigate the functional potential of extended CaaaX motifs. Over the course of the study, nearly 40,000 recombinant colonies were screened and 24 of those colonies tested positive for production of a-factor. Upon retesting to validate the positive hits, only eight retested positive. Based on the collected data, it appears that the longer CaaaX motifs may be biologically relevant.

Using Next Generation Sequencing to Identify Unique Sequence Types Associated with Gravidity-based Immunity in Placental Malaria

Stephen Scott
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Even with a global effort to eliminate malaria, the disease caused primarily by the parasite *Plasmodium falciparum* continues to threaten entire regions of the world, particularly pregnant women and newborns living in sub-Saharan Africa. In 2010 alone there were 215 million clinical cases and 655,000 reported deaths due to malaria. In pregnant women, *P. falciparum*-infected red blood cells accumulate in the placenta by adhering to receptors on fetal cells called synthiotrophoblasts. The parasite ligands and host receptors that mediate cytoadherence have been extensively investigated, resulting in the discovery of a protein encoded by a single member of the highly polymorphic *var* gene family called *var2csa*. During placental malaria (PM), *var2csa* mediates binding of infected red blood cells to synthiotrophoblasts in the placenta. We have recently completed a project assessing the *var2csa* diversity in Kenyan placental samples, which has important implications for the development of immunity to PM. We used nested PCR and applied high-throughput DNA sequencing and bioinformatics analysis to these samples for which clinical information including placental pathological state are known. As a result, we were able to identify gravidity associated immunity and unique sequence types. This information will be critical for the development of a PM vaccine.

***Pseudo-nitzschia* in the Diet of *Paraprionospio pinnata*, a Polychaete in the Gulf of Mexico Hypoxic Zone: Potential Mechanism for Toxin Bioaccumulation**

Chelsea Sexton
Dr. James Byers, Odum School of Ecology

Anthropogenically-derived riverine nutrients stimulate spring phytoplankton blooms, including the potentially toxic diatom *Pseudo-nitzschia spp.*, over the continental shelf waters in the northern Gulf of Mexico. Cells of *Pseudo-nitzschia spp.* that are not grazed in the upper water column sink to the seafloor and likely contribute to the carbon that fuels bottom-water hypoxia. Opportunistic polychaetes are essential members of the marine benthic community in areas affected by low oxygen conditions. With better survival in hypoxic bottom conditions (≤ 2 mg L-1 dissolved oxygen) than most infauna, they play a year-round role in benthic-pelagic

coupling and transfer of organic matter to upper trophic levels. We collected the polychaete, *Paraprionospio pinnata* at a station 100 km west of the mouth of the Mississippi River monthly from Aug 2003 to Oct 2004 to determine their gut contents. *Pseudo-nitzschia spp*., which are capable of producing the neurotoxin domoic acid, comprised 2.8% ± 1.0% (n=27) of the total diatoms consumed per polychaete. The presence of intact cells of *Pseudo-nitzschia spp*. on the sediments and in *P. pinnata* gut contents supports the inference of the dominant polychaete in this hypoxic area as a potential vector of domoic acid to upper trophic levels.

The Unpublished Letters of Elizabeth Bishop

Fiona Sheehan
Dr. Susan Rosenbaum, English, Franklin College of Arts & Sciences

Elizabeth Bishop was one of the most important poets of the 20th century, yet she only published 100 poems in her lifetime. Most of her biography comes from her letters. My grandmother, Rhoda Wheeler Sheehan, and Bishop were lifelong friends, and Rhoda was one of her closest friends during the last decade of Bishop's life. My research examines the biographical and literary significance of 49 unpublished letters and postcards from Bishop to my grandmother, sent between 1969 and 1979. Additionally, this collection of correspondence is one of the largest from this period in her life. I will summarize research from my directed reading through a PowerPoint with slides of Bishop, Rhoda, and several key letters. I analyzed their literary and biographical significance, researched my grandmother and Bishop's relationship, and researched scholarly opinion of letter-writing and postcards as an art. I found that at times Bishop used correspondence to generate material for her poems and to engage her correspondents in a collaborative, creative effort. Additionally, my letters are artful in their own right: many poetic descriptions and even a drawing are woven into Bishop's letters, something rare for her to include in correspondence. The letters also provide insight into events Bishop was thinking about at the time—from Indian land settlement claims to US space laboratories falling to earth. This semester I continue my research in the form of a senior thesis. This summer I will write and submit my research for publication.

Effects of the Amazon River Plume on Subsurface Waters: Measuring the Effectiveness of the Plume's Uptake of Atmospheric CO_2

Megan Sheehan
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The Amazon River plume is an important biological pump for the Atlantic Ocean, acting as a sink for atmospheric CO_2, and providing an important mechanism to counteract increasing amounts of CO_2 in the Earth's atmosphere. This study is centered on the question of how effective the plume is in sequestering atmospheric CO_2. To quantify this, water samples were taken from the plume's surface and subsurface waters. Bacterial respirations were measured from this water by measuring the amount of dissolved inorganic carbon available in the water after incubation. This study is proposing that the surface plume bacterial respiration rates are affecting the subsurface plume bacterial respiration rates. If indeed there is a trend between the surface and subsurface bacterial respiration rates, this will be an indicator that the bacteria at the surface of the plume are sinking atmospheric CO_2 and the subsurface bacteria are using it. Surface respiration rates within and around the plume have already been analyzed and show a strong relationship between bacterial respiration rates and salinity of the water. Low salinity water, or freshwater, has high respiration rates, and high salinity water, or ocean water, has lower respiration rates. The remaining subsurface

bacterial respirations will be compared to the surface respiration rates, and a trend between them will be determined. If there is no trend, then other factors, such as chlorophyll and nutrient availability, will be examined with the respiration rates in order to see if another relationship is available between the surface and subsurface plume waters.

Searching for the Minimal Segment of Alpha Toxin Necessary for Binding to GPI-anchored Proteins on Cancer Cells

Collin Shumate
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Ovarian cancer is one of the more difficult cancers to diagnose because symptoms do not arise quickly and because tests are currently quite invasive for a simple check-up. Our research aims to contribute to diagnostics of cancer by exploiting the differences in cancer cells from healthy cells. Cancer cells over-express genes that cause the cells to produce certain GPI-anchored proteins, which anchor to the outside of cells. Because the genes are over-expressed, GPI-anchored proteins are elevated in these cancers, such as breast carcinoma and ovarian cancer. Alpha toxin is a protein of interest that binds to GPI-anchored proteins. It is structured similarly to aerolysin and they function and bind to GPI-anchored proteins much in the same way. I am using PCR amplification of the alpha toxin DNA to produce a variety of lengths of alpha toxins to perform binding assays with GPI-anchored proteins. Our research aims to find the minimal portion of alpha toxin needed to bind to GPI-anchored proteins so that diagnostic assays can be developed by taking advantage of alpha toxin without the toxic functionality being expressed.

Self-control in the Workplace: The Relationships between Self-control and Perceived Task Difficulty

Lane Siedor
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

Recent research suggests that managers delegate more tasks to people with high self-control. Furthermore, they are less likely to reward people with high self-control for high quality work. The purpose of the present work was to test the hypothesis that managers underestimate how difficult tasks are for people with high self-control. Participants (N = 120) were recruited from an undergraduate research pool. Participants were randomly assigned to either an actor role or an observer role. The actor was designed to simulate an employee and the observer to simulate a manager. Both participants completed questionnaires that provided background information and a typing task, in which they followed complicated instructions in retyping a text. The actor completed an eight-minute version of the typing task while the observer typed a brief paragraph, enough exposure with the task to assess how hard the full-length version might be for someone else. Then, the observer was given false information about the actor's self-control and asked to make predictions about how difficult the typing task was for the actor. The self-control information was randomly assigned so that half of the actors were presented as having high and half as having low self-control. Additionally, actors reported how difficult they found the task and we assessed their state self-control levels objectively using a Stroop task. Preliminary results support our hypothesis. The observers thought the task was easier for actors believed to have high (vs. low) self-control. However, actors with high and low self-control reported the task to be equally challenging.

Abstracts

Characterization of an RNA-protein Immune Complex Functioning in Prokaryotic Viral Defense

Cole Skinner, CURO Honors Scholar, CURO Summer Fellow
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CRISPR-Cas (Clustered Regularly Interspaced Short Palindromic Repeats – CRISPR associated) systems provide bacterial and archaeal organisms with genetically based, heritable defense from nucleic acids of viruses or other genomic invaders. In a CRISPR-containing host, Cas proteins bind invader-derived crRNAs (CRISPR RNAs) produced from the CRISPR locus to form crRNPs (CRISPR ribonucleoproteins), which provide the primary line of defense against invaders. At least ten structurally and functionally diverse CRISPR-Cas immune systems have been discovered that each consist of specific Cas proteins and associated crRNA species. The objective of my work is to characterize the structure and function of a previously uncharacterized immune system (the *Tneap* complex) from the hyperthermophilic archaeaon, *Pyrococcus furiosus*. Our evidence indicates that the *Tneap* complex is comprised of four Cas proteins (Cas5t, Cst2, Cst1 and Cas3) and a specific crRNA form that has a functionally important sequence element (called the 5' tag). To gain a detailed understanding of the structural organization and function of the *Tneap* immune complex, we attempted to reconstitute these complexes *in vitro* from recombinant, purified *Tneap* Cas proteins and synthetic crRNAs. Using native gel electrophoresis mobility shift assays, I observed 5' tag-specific binding of the *Tneap* proteins to a crRNA to form specific crRNP complexes. Moreover, I found that the assembled crRNP stably associates with complimentary DNA targets (that mimic viral sequences). Further characterization of this CRISPR-Cas system could contribute to ongoing work to develop CRISPR-based technologies with important industrial and biomedical applications.

Multiple Marlows: Intertextuality and Irony in Conrad's Marlow Tales

Samuel Smith
Dr. Adam Parkes, English, Franklin College of Arts & Sciences

Joseph Conrad wrote four texts featuring Charles Marlow as a first-person narrator: "Youth" (1898), *Heart of Darkness* (1899), *Lord Jim* (1900), and *Chance* (1914). Conrad's redeployment of Marlow raises several questions. How does Marlow function as both a narrator and a character in each individual text? How are each of his incarnations related to those in the other three works? To what degree is it valid to read the Marlow of one text as being continuous with the Marlow of another? All of these questions deal with intertextuality, a theoretical concept that is concerned with the way in which—and the extent to which—texts depend on other texts to generate meaning. I will approach these questions by investigating Conrad's use of Marlow as an ironizing narrator and an ironized character, both in each text and in the collection of these four texts. I see Conrad's redeployment of Marlow as a conscious move to separate the Marlow texts from his other works, effectively indicating that we should read them together. However, at the same time, Conrad's decision to create four works that can stand on their own indicates that they can and should be read on their own as well. I will argue that while both ways of reading the four Marlow texts are valid, holding each reading in tension with the other produces an effect that deepens the ironic meanings of both the individual texts and the ironic project that is the collection of the four texts.

Abstracts

The Black Youth Vote in the 2012 Presidential Election: Disillusioned or Reenergized?
Elijah Staggers
Dr. James Bason, Vice President for Research Services, Vice President for Research Units

This research project investigates the political attitudes of the black youth vote in the 2012 Presidential Election between Barack Obama (D) and Mitt Romney (R). Research suggests that African American youth voters recorded the highest increase in voter turnout during the previous 2008 Presidential Election. I will attempt to establish a continued trend in voter political participation and optimistic political attitude of this demographic for the 2012 presidential election. I will also attempt to prove the existence of a "shared identity" between Barack Obama and the minority youth vote. This specific question will also shed light on a larger political question, whether the debated success of Barack Obama's policies during his first term in office have disillusioned a voting bloc which he strongly retained in 2008. The method of this research involves the distribution of a survey to gauge the political attitude of the black youth vote approaching the 2012 Presidential Election. The data yielded evidence to suggest a continued trend in African American youth voter support of Barack Obama, with 67% of African American youth describing their political attitude as "enthusiastic," 76% of African Americans viewing Barack Obama's first term policies as successful, and 95% of African Americans youth holding a "shared identity" with Barack Obama. This research demonstrates that despite criticism of Barack Obama's policies, the African American youth demographic still unilaterally supports him. Moreover, it reveals a trend in voting behavior, evidencing a positive correlation between that high level of support and a "shared identity" and political attitude.

Body Size and Temperature: A Report on Moth Activity in Clarke County
Victoria Staples
Dr. John Pickering, Odum School of Ecology

Because insects are ectotherms, their activity depends on temperature. We hypothesize that the flight activity of smaller moths will be more affected by temperature than the flight activity of larger moths. To test this hypothesis, a data set of 71,000 photographs of moths will be analyzed. In this study, a community of moths was attracted to a study site in Clarke County, Georgia and documented nightly, in photographs, for two years. Of these photographs, 93% of moths have been identified to more than 850 species, and most photographs contain rulers from which wing size may be measured and used as a proxy for body size. We will present an analysis of this data set and a weather data set collected by weather stations at the Ben Epps Airport and in Winterville, Georgia to correlate body size and flight activity with temperature. A natural experiment such as this may aid in the understanding of moth communities as they are affected by global climate change.

Sitcom Technology through the Ages
Jared Stepp
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

Media technology has changed drastically over the years; we've gone from hand cranks and film reels to computers and digital effects, grainy black and white to vivid high definition, and each day we build new technologies that promote innovation and bolster the creativity that we see on television from the comfort of our own homes. My project is to track these changes through the use of Russell Special Collections Library's Peabody Award winners, to create a standard for comparison. Our favorite shows like *Modern Family* use these developing technologies to enhance their storytelling. My

area of focus is the technology used at the time, and how it shaped the potential of the show—if the show was filmed in front of a live audience, the opportunities for quick camera maneuvers are lost; if the show is recorded in high definition, special considerations need to be undergone for makeup and costume design, etc. Sitcoms are one of the greatest flagships for our history; they represent the trials we face in our modern lives. The area of relevance to current events helps signify the state of technology and the limits that are held within. I recorded a digital narrative to show the progression of many features, including several scenes that best represent them. I begin with the early stages of single-shot studio audience sitcoms and progress to modern day multi-camera sitcoms, closely analyzing the range of camera, sound, directing, and acting capabilities brought forth by the developments in sitcom technology through the ages.

Developing Methods to Locate and Survey for Rare Species: a Case Study Using the Endangered Bog Turtle (*Glyptemys muhlenbergii*)

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

North America's smallest turtle, the bog turtle (*Glyptemys muhlenbergii*), is listed as threatened under the Endangered Species Act, mainly due to habitat loss and deterioration. Cryptic and rare, this species is difficult to find and consequently many states are still in the process of locating bog turtle populations. To aid this cause we are (1) developing a species distribution model (SDM) to better identify areas in the landscape suitable for bog turtles, and (2) use a mark/recapture study to determine the best trapping methodology and minimal effort required to estimate bog turtle presence/absence at a site, ultimately designing a step-by-step process for state agencies to locate and survey for bog turtle populations. A preliminary SDM, using MaxEnt, indicates that elevation, distance to wetland, slope of the landscape, and maximum temperature of warmest month are best at predicting suitable bog turtle habitat. By overlaying the model with topographical maps, satellite imagery, and known bog turtle sites, areas to survey will be located and prioritized. One season of mark/recapture data from 8 Georgia bogs, using a standard trapping density, shows that detection probabilities at the bog level, as calculated in Program MARK, ranged from 0.05 to 0.01. This detection probability will then be used to determine trapping effort required for each site. Combining these parts, this project gives state wildlife agencies an efficient methodology to locate and survey for bog turtles, but more generally, it is a case study that contributes to refining how biologists survey for rare and cryptic species.

For the Love of God: Damien Hirst and a Room with a Corpse

Emily Stubbs
Prof. Isabelle Wallace, Lamar Dodd School of Art, Franklin College of Arts & Sciences

In order to meaningfully reframe the issue of western religion in contemporary art, this paper explores the religious implications of Damien Hirst's work involving dead animals. Western religion and art have a long, flourishing history together. In the Age of Enlightenment, however, God became more abstract, the world became more secular, and production of religious art markedly decreased. In recent years, religion has become entirely estranged from the art world. Many artists and art historians claim that religion has no place in contemporary art. Despite such claims, there are a number of celebrated artists whose work clearly engages with religion. In *Postmodern Heretics: The Catholic Imagination in Contemporary Art*, Eleanor Heartney expounds on the relationship between postmodern art and the Catholic imagination. While there is validity to her argument, the framework Heartney lays out is

limited, not accounting for the entire picture. Although Damien Hirst's work confronts death as does Andres Serrano's *Morgue* series, Hirst's clean, scientific aesthetic, reminiscent of minimalism, seems diametrically opposed to the sense of Catholic morbidity that Heartney asserts in Serrano's work. Nonetheless, Hirst's work – in its use of dead animals, formaldehyde, and the vitrine – stages impulses that are religious. *The Physical Impossibility of Death in the Mind of Someone Living*, perhaps Hirst's most famous work, beckons viewers to reflect upon their own projections of death. Criticisms of Hirst's financialization of art notwithstanding, Damien Hirst's provocative engagement with western religion is significant of a much greater current within contemporary art that remains insufficiently examined.

The Characterization of F-actin/34kDa Binding Sites and Their Contribution to the Formation of Model Hirano Bodies

Connor Sweetnam, CURO Honors Scholar, CURO Summer Fellow
Dr. Marcus Fechheimer, Cellular Biology, Franklin College of Arts & Sciences

Hirano bodies (HBs) are paracrystalline inclusions that appear frequently in autopsied brains of those affected with neurodegenerative diseases. They have been shown to play a potentially protective role in disease pathways. HBs are composed of highly ordered actin filaments. Actin, both monomeric and filamentous, is a component of the cytoskeleton that is necessary for cell shape changes and movement. Actin filaments are regulated by actin binding proteins resulting in the dynamic organization of polymerized actin. Mutations in the 34,000-Dalton F-actin Bundling Protein (34 kDa) have been shown to induce the formation of model Hirano bodies in amoeba and mammalian cell culture models. We are interested in characterizing the sites of F-actin/34 kDa interaction in order to further analyze the biochemical basis of 34 kDa regulation of F-actin and the formation of Hirano bodies. We previously identified specific sites of interaction between the two proteins by chemical cross-linking, proteolytic digestion, and mass spectroscopy. Now, using techniques in molecular biology and protein purification, we have generated point mutations of the 34 kDa protein in three F-actin binding sites. We will study the effect of these alterations on F-actin/34 kDa binding. Further characterization of this interaction could help us understand the biochemical basis of the induction of Hirano body formation.

There's Another Side to the Story: Examining the Blacklist Resulting in the HUAC Hearings of the 1950s

Ashley Thompson
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

In the 1950s, the House Un-American Activities Committee gained wide recognition for holding hearings and questioning people as to if they were members of the Communist Party. The media portrays this committee in a post-Cold War culture as heartless, due to their extreme measures for extracting information on affiliation with the Communist Party. However, every story has two sides, and I wanted to know how Americans could have participated in the 1950s witch hunts that destroyed so many lives. To answer my question, I conducted research in the Richard B. Russell Library for Political Research and Studies to learn what Senator Russell and his constituents thought of the Red Scare. Evidence demonstrates that Russell, as well as many other American citizens, had a genuine fear of warfare occurring between the United States and the Soviet Union. The measures now considered so extreme were actually a way for government officials to provide a protective barrier against Communist ideals. Materials examined include correspondence between Senator Richard Russell and his constituents

as well as submitted materials to the Senator. These materials include such items as comic books, newspapers, tracts, and sermons detailing the dangers of Communism. Results from this research provide evidence that no event in history is simple, and sometimes methods that may seem extreme after the fact were not only accepted, but encouraged at the time they originally occurred.

The Anti-Inflammatory Effects of Lipoic Acid on Inflammatory Cytokines

Lauren Titus, CURO Graduation Distinction
Dr. Nick Filipov, Physiology & Pharmacology, College of Veterinary Medicine

Dopaminergic cell death in the substantia nigra produces most symptoms of Parkinson's Disease (PD). While the cause(s) of this cell death is still largely unknown, numerous studies have demonstrated that reactive oxygen species and inflammatory cytokines, produced in activated microglial cells, damage neighboring dopaminergic neurons, possibly by triggering apoptosis. Microglia are activated by multiple factors, one of them being LPS, an endotoxin from gram(-) bacteria. My research focuses on the anti-inflammatory effects of lipoic acid (LA), an anti-oxidative fatty acid capable of passing through the blood-brain barrier. Because certain antioxidants also exhibit anti-inflammatory properties, I hypothesized that LA would decrease inflammatory cytokines produced by microglia. If neuroinflammation of microglia can be reduced by LA, then potentially the severity of PD could be lessened. In previous research, I pre-treated microglial cells with LA and then activated them with LPS. Using ELISAs and qRT-PCRS, I found that LA pre-treatment corresponds with significantly decreased transcription and expression of the cytokines TNF-α and IL-6, especially TNF- α. Western blots demonstrated that LA inhibited the activation of NF-ϰB, a key inflammatory transcription factor. My current research involves the surface molecule F4/80, which is upregulated upon microglial activation. Data from qRT-PCRs revealed that LPS significantly increases F4/80 transcription. LA (both alone and in conjunction with LPS) decreases F4/80 transcription by 15-30%, but this effect did not reach significance ($p \geq 0.10$). These results demonstrate that LA has effective anti-inflammatory properties, but its main mechanism of action occurs within the cell, not by upregulation of cell surface molecules associated with microglial cell activation.

The Women of *Richard III* Re-visited

Margaret Touchton
Dr. Lisa Bolding, English, Franklin College of Arts & Sciences

Based upon the War of the Roses, Shakespeare's historical tragedy *Richard III* is a play about the formation of the Tudor dynasty and the villain who nearly ruined it all. Many of the studies done on this play focus on the antihero, but few have focused on the women whose lineage gave birth to the female monarch, Elizabeth I. While some are quick to brush away the significance of the women in *Richard III,* there are echoes of Elizabeth's life and rhetoric in the roles Shakespeare created for her foremothers. Through analysis of the text, historical documents, Elizabeth I's speeches, and literary criticism, this study examines how various stages in her life are reflected in Shakespeare's portrayal of her foremothers' story. The play paralleled their transition from being powerless, to political tools, and finally gaining their own agency, like Elizabeth during her life. This correlation is unusual since during Shakespeare's time women had a subservient role to men. Even though England was ruled by a woman, there were few changes in the cultural attitude towards women. Thus the parallel between these women and a powerful queen not only suggests their importance in the play but also challenges societal norms by featuring strong women. The agency these women gain throughout the play has been overlooked by

existing scholarship and this study seeks to amend this problem.

Determining a Method for Pharmacologic Rescue of Mutations that Affect Tissue-specific Glycan Expression in *Drosophila melanogaster*

Brittany Truitt, CURO Summer Fellow
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Protein glycosylation is essential for cell-cell signaling, cellular differentiation, and tissue formation, yet its regulatory mechanisms are highly unknown. While examples of cell and tissue specific glycosylation are abundant among all animal species, the fruit fly, *Drosophila melanogaster*, provides an excellent tool for discovering genes that might regulate this process. In a screen for mutations that disrupt neural-specific glycosylation, we identified a gene called sugar-free frosting (sff) that affects the expression of a particular class of glycans in the embryonic nervous system. Based on genetic interactions between sff and a gene involved in the biosynthesis of biogenic amine neurotransmitters, we hypothesized that pharmacologic treatment of sff mutant embryos with anti-depressant drugs might rescue neural glycan expression. Therefore, we undertook the development of a method for delivering drugs into the embryo. Such treatment is difficult because of the numerous layers that surround and protect the embryo. The waxy layer surrounding the vitelline membrane has proven to be an especially problematic layer because it is impermeable to small molecules. Our current approach involves the use of a previously identified embryo permeabilization solvent (EPS) containing limonene, alcohol, and a cocamide mixture which may dissolve the waxy layer. Using this technique, we have succeeded in allowing a small fluorescent dye to gain access to the embryo without affecting viability. The current goal of this research is to optimize a reproducible method to allow an assessment of the pharmacologic effects on tissue glycosylation.

The Role of Cognitive Tasks in the Conceptualization and Assessment of ADHD

Kelly Tucker
Dr. Janet Frick, Psychology, Franklin College of Arts & Sciences

Attention Deficit Hyperactivity Disorder (ADHD) is defined by the DSM-IV-TR as a behavioral disorder with an onset of hyperactive or inattentive symptoms that must be present prior to age seven. The DSM-IV-TR specifies that these symptoms must be present in two settings and, therefore, most children are diagnosed based on parent and teacher behavioral ratings. There is a need for objective cognitive-based tasks that clinicians could utilize to substantiate their diagnosis of ADHD in children. This literature review discusses the ways in which cognitive tasks may help to narrow the conceptualization of ADHD, as well as provide a more objective way of assessing the disorder in children. We reviewed literature that examined two models of conceptualizing the etiology of ADHD as due to deficiencies in working memory or inhibition. This literature review utilized these models as a framework to investigate laboratory-based tasks that are currently being researched as possible ADHD assessment techniques. We found recent evidence that supports the idea that ADHD is caused by deficiencies in working memory, as well as some evidence that speaks to the validity of tasks that test children's ability to delay gratification in detecting ADHD. This literature review integrates theoretical and empirical findings that may inform future research, and more specifically serve as background for the study of whether the inattentive and hyperactive subtypes of ADHD may be caused by two separate cognitive deficiencies.

Abstracts

Differential Expression of RGS Proteins During Neural Differentiation

Katie Tuggle, CURO Graduation Distinction
Dr. Shelley Hooks, Pharmaceutical & Biomedical Sciences, College of Pharmacy

G-protein coupled receptors are ubiquitous cell surface molecules that control an abundance of physiological functions. These include but are not limited to immune response, neurotransmission, muscle contraction, and cell proliferation. Regulators of G-protein signaling (RGS) proteins halt the G-protein signaling cascade by acting as GTPase-accelerating proteins and turning the G-protein back into its GDP-bound, inactive state. The goal of this study was to determine if RGS expression changes during neural differentiation. qRT-PCR analysis revealed the expression of RGS proteins is dynamically regulated as cells transition from a neural progenitor into a neuron, thus changing the signaling capabilities of their respective GPCRs. Characterizing the expression changes of RGS proteins and understanding how the cell alters the expression of these proteins is paramount in developing a comprehensive understanding of cellular function. Many genes of RGS proteins have high levels of CpG sites in their promoter region, which indicates the possibility of epigenetic regulation by DNA methylation. DNA methylation involves the activity of DNA methyltransferases (DNMTs) and results in the silencing of the gene. After treatment of neuroblastoma cells with a DNMT inhibitor, qRT-PCR revealed the upregulation of mRNA transcripts of many RGS proteins, suggesting DNA methylation plays a role in the regulation of these proteins. The study of the regulatory mechanism of RGS proteins provides insight into how RGS proteins can be targeted in the treatment of various diseases.

Major Clarity in a Minor Paradox: The Role of Mark 9:24 in Illuminating the Markan Conception of Faith in the Context of Discipleship

Lindsay Ullrich
Dr. Wayne Coppins, Religion, Franklin College of Arts & Sciences

"I believe; help my unbelief!" is the cry of a minor character in Mark's gospel, a father seeking Jesus' help in healing his possessed son. Scholars often interpret this verse, Mark 9:24, and the surrounding passage as evidence that the father is a substandard model of discipleship and faith. This paper argues that biblical criticism, specifically narrative criticism, reveals that it is better to interpret the father as a positive model that furthers Mark's development of what faith should look like in the context of discipleship. Examination of this verse consisted of studying the interplay of the characters presented and looking at the passage in the context of the larger narrative. Contemporary theories concerning minor character function and the Markan definition of faith informed the analysis. Findings indicated that Mark 9:24 functions to add a depth dimension to the flat portrayal of Mark's ideal discipleship presented in a later character. Markan faith has an allowance for struggle, and examination shows that the father not only helps reveal this but also functions as a positive model of Mark's ideal proper response to it, namely reliance on Jesus and, ultimately, God. This finding not only redirects current views of this passage in Markan scholarship but also puts a sharper focus on the depth Mark presents in his realistic portrayal of faith. This portrayal, in turn, contributes to the dialogue in religious circles and beyond concerning what faith and doubt mean as part of the human experience and how the tension between them should be handled.

Abstracts

Mechanism of Gap Junction Inhibitor Carbenoxolene (CBX) in Regulating Gap Junction Proteins in ECC-1 Cells

Michelle Uzor
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Embryo implantation is a prerequisite process for successful pregnancy in mammals. It requires a competent embryo, a receptive uterus, and synchronized communication between them. How a uterus becomes transiently receptive for an embryo to implant is still largely unknown. Our *in vivo* study shows that carbenoxolene (CBX, a gap junction blocker) prevents the upregulation of gap junction proteins alpha1 (*Gja1*) and beta 2 (*Gjb2*) mRNA levels in the uterus, and disrupts uterine preparation for embryo implantation in mice. The mechanism by which CBX blocks uterine transformation for implantation is unknown. We hypothesize that CBX inhibits the transcription of *Gja1* and *Gjb2*, the two prominent gap junction proteins in the uterus upon implantation, and prevents the cellular and morphological changes associated with the establishment of uterine receptivity. To test the hypothesis, human endometrial cancer cell line ECC-1 cells are cultured and treated with different concentrations of CBX (0, 1 μM, 10 μM, 100 μM, and 500 μM). The end points include *Gja1* and *Gjb2* mRNA levels determined using realtime RT-PCR, cell morphology determined by F-actin staining, and cell proliferation/death determined by Trypan blue staining and cell number counting. Data collected so far indicate that 500 μM CBX decreases the number of live cells, most likely due to increased cell death. I have mastered all the needed techniques, and the data from the other two end points are being collected.

Purification of Periostin for Future Protein Screening Assays

Tram Van
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Periostin (POSTN) is a secreted extracellular matrix protein that contains an EMI and four Fasciclin (FAS1) domains. The protein promotes cell adhesion, cell attachment, and spreading of osteoblasts. Previous studies indicate that tumor-specific glycosylation changes on periostin are potential biomarkers for breast and ovarian cancer. As periostin has an *N*-linked glycosylation site at the amino acid numbered 599, we applied the program named Clustal Omega to examine how conserved sequences of periostin excreted from humans, mice, and frogs are at the *N*-linked site in the fourth FAS1 of the C-terminus. The result showed that the *N*-linked glycosylation site of periostin is highly conserved from humans to frogs. The conservation of the *N*-linked site in periostin suggests structural and functional importance. We would like to purify periostin with tumor-specific glycosylation for future functional studies and for use in the development of diagnostic cancer detection assays. We are adding a His-tag into the C-terminal end of periostin using a PCR strategy. Success in doing so will yield a massive amount of purified proteins for future experimental purposes. Although we are still in the process of completing the expression of periostin, the results we have gotten so far have supported our hypothesis, and moving forward should yield positive results with a His-tag put on periostin.

Abstracts

A Critical Examination of Anglicanism in the Life of Laurence Sterne and its Implications within *Tristram Shandy*

Jacqueline Van De Velde, Foundation Fellow
Dr. Elizabeth Kraft, English, Franklin College of Arts & Sciences

It is no surprise that *The Life and Opinions of Tristram Shandy, Gentleman* by Laurence Sterne was once dubbed the "dirtiest novel in English." Sexual innuendo and scatological humor pervade the pages of the novel – and, unhappily by extension, the minds of the reader – from the very first pages of the book, as Walter Shandy mourns the moment of Tristram's untimely conception. From then onwards, a slew of jokes, wisecracks, and sly comments, each with highly-charged sexual undertones, sustain the narrative. However, Sterne's authorial indecency is made all the more shocking when viewed in the context of his profession: an ordained minister of the Anglican Church. For a clergyman to engage in such bawdy writing seems strange, if not altogether blasphemous, and critics have sought to make sense of Sterne's unseemly mixture of professions since *Tristram Shandy*'s publication. Despite extensive literary scholarship on the text, several bibliographical and textual questions remain unanswered. Does Sterne's work within *Tristram Shandy* build upon the work of his pre-literary career as a clergyman? Despite its bawdy nature, does it purvey a Christian, specifically Anglican, ethic? Through an exhaustive study of Sterne's biography, examination of the reception of *Tristram Shandy* and Sterne's *Sermons*; and close readings of the elements of Anglican theology that were promoted – or misinterpreted – within *Tristram Shandy,* I will answer these questions, yielding clarity to Sterne's own life and opinions, which then will serve a reader as a guidepost within the otherwise often confounding narrative present in *Tristram Shandy*.

Crossing the Threshold: British Integration Policy through Haifa Zangana's *Women on a Journey Between Baghdad and London*

Jacqueline Van De Velde, Foundation Fellow
Dr. Esra Santesso, English, Franklin College of Arts & Sciences

Over the past fifty years, the Muslim population in Europe has grown from tens of thousands to 16 or 17 million – or approximately one out of every twenty-five Western Europeans – in 2010. Projections show continued demographic growth before leveling off at 25-30 million people (or 7-8%) in 2030, and the increasing tactical importance of the Middle East and North Africa solidifies the West's need to successfully engage Muslim populations in order to strengthen its own peace, security, diplomatic missions, and economic interests. Western European governments have no choice but to examine and engage with their current Muslim population as a force both permanent and enduring. Governments around the world are desperately seeking the answer to this Muslim question: what factors encourage integration, and what should the state's role be within the integration process? In my paper, I will provide an answer to this question through exploring literature as testimony: examining Kurdish-Iraqi refugee Haifa Zangana's novel *Women on a Journey Between Baghdad and London*, which documents the lives of five Iraqi immigrants to London. In my paper, I analyze the extent to which each of the five characters integrates into society, searching for common trends which either encourage or discourage the process. At the conclusion of my paper, I will present a case study, useful within European domestic policy, identifying the behaviors that encouraged integration within literature and to suggest ways by which states can utilize policy to encourage the integration process.

Abstracts

An Analysis of the Effect of Phytase Phosphorous Absorption and Growth in Nursery Pigs

Emily Vermillion, CURO Honors Scholar
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Phytase is an enzyme that breaks inorganic phosphorous found in plants from its phytic ring into organic phosphorous that can be absorbed and utilized by the animal. Phytase is absent from pigs' gastrointestinal tract; therefore, pigs are unable to effectively absorb the inorganic phosphorus in their plant-based diet. To meet nutritional requirements, large quantities of supplemental phosphorous must be fed, or phytase must be added to the diet. When large amounts of phosphorous are added without phytase, substantial quantities of this phosphorous are still excreted. In this study, 24 nursery pigs of mixed gender are randomly assigned to 12 pens. There are 3 feeding phases which correspond to weeks 1-3 following weaning. There are two dietary treatments in each phase, one diet with phytase and one without phytase to serve as a control. Samples of the phase I diet, and phases II and III control and phytase diets are all analyzed to determine initial nutrients available. Fecal samples are collected from each pen at the end of each dietary phase and analyzed for excreted nutrients; thus, total absorbed nutrients can be measured. Additionally, pigs are weighed weekly to measure and compare growth rates of pigs. If phytase is added to the recommended diet, then pigs should be able to absorb more available phosphorous and thus grow at a faster rate. Our data will presumably affect nutritional composition of swine diets by reduction of phosphorous supplements and addition of phytase, thus improving overall nursery pig performance.

Capuchin Monkeys and Emotional Contagion: Displaying Affiliation towards Humans Who Imitate Them

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

An expansive literature details the phenomenon of emotional contagion, or the matching of another's emotions and behaviors, in humans. Synchronizing behaviors with another may facilitate group cohesion and interpersonal relationships, because we tend to like people who match us. In the long term, this phenomenon may be adaptive because we are more likely to be generous and helpful towards those who match our behavior. Recent research supports the idea that emotional contagion exists in other species as well. This study looks into whether capuchin monkeys, like humans, display affiliation towards humans who imitate them by spending more time in proximity to, looking at, or exchanging tokens with a human that they "like" rather than another human. We will test seven male capuchin monkeys individually using these conceptualizations of "liking" to answer this question. In each of several sessions, for a five-minute period, we will videotape the monkey while one human imitates the monkey's actions and another human performs contingent, yet non-matching actions. Subsequently, we will code the monkey's behavior from video in playback mode, producing quantitative data (frequencies, durations) for statistical analysis. We hypothesize that the monkeys will tend to spend more time in proximity to, looking at, and exchanging more tokens with the imitator rather than the non-imitator. If the monkeys do not exhibit these preferences, this may suggest that capuchin monkeys do not prefer humans who imitate them, and thus that the phenomenon of emotional contagion is not present in this species.

Abstracts

Effective Organization of Complex Visual Information

Kylie Wagner
Prof. Julie Spivey, Lamar Dodd School of Art, Franklin College of Arts & Sciences

The conference poster is a popular medium used to display research results. An effective poster conveys the essence of its message in a compact, comprehensible format, with the integrity of its information as its top priority. However, creating such a poster can be difficult for the non-designer, and as a result many posters suffer from a severe lack of information organization, utilizing graphic gimmicks (e.g. drop shadows, text boxes, garish color schemes), that hinder the transfer of content to viewer. The consequence is a diminished impact of the presenter's work, and by extension, their own professional credibility. Using the conference poster as a case study, I will investigate visual and typographic devices that improve readability and legibility, such as line length, font choice and size, layout principles, and data arrangement. I will study contemporary research in the fields of visual communication, marketing, eye tracking and reading comprehension, and then synthesize these findings into a set of basic guidelines useful to non-designers. Once this process is complete, I will take pre-existing posters and re-design them, then conduct comparative tests such as survey and eye-tracking analyses to assess their effectiveness. The criteria for a poster's success will be based on the level of comprehension by its audience, as opposed to mere aesthetics. Visual communication has the potential to inform, educate, and persuade its audience. By determining what visual formula maximizes readability for intended viewers, we discover the most effective way to transmit complex content in a concise manner.

Navigating Sickle Cell Disease in Africa

Amelia Watson
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Sickle cell disease (SCD) is caused by abnormal hemoglobin structure, causing deformed, sickled red blood cells that can clot easily. Globally, 7% of humans carry an SCD variant. Africa has high estimates of SCD-related mortality, particularly in children, but lacks reliable data to address the issue. Without relevant epidemiological data, providing medical aid to areas of greatest need is impossible. Systematic data collection allows countries to intensify efforts on areas that need most help; it successfully decreased incidence of other African diseases, including HIV/AIDS. Because SCD lacks relevant data, it continues to have high incidence and mortality rates. The research question is: what policy option will be best suited for this problem? Several different approaches were examined to determine this problem: status quo, premarital screening, and newborn screening. These were examined for cost effectiveness, decreasing SCD incidence, decreasing childhood mortality for SCD, and increasing SCD data collection. The best way found to decrease the high incidence of SCD-related deaths and collect the most data is to develop newborn screening in urban hospitals and rural clinics. Screening, paired with education, impacted childhood mortality in many other countries. US newborn screening resulted in a 68% reduction in SCD-related mortality (ages 0-3). Once diagnosed, caretakers can plan their families and raise them accordingly with education from health care providers and genetic counselors. Data, paired with education, is key to this process, as it allows states to allocate resources for preventative measures.

Abstracts

Associations between BMI and Folate Status of Normal Weight and Obese Women of Childbearing Age

Arielle Weekley
Dr. Dorothy Hausman, Foods & Nutrition, College of Family & Consumer Sciences
Dr. Lynn Bailey, Foods & Nutrition, College of Family & Consumer Sciences

Folate is a water-soluble B vitamin required for cell division and especially critical during periods of rapid growth. Sufficient folate status is important prior to conception to reduce the risk of neural tube defects (NTD) during early embryonic development. NTDs result from incomplete closure and exposure of the central nervous system and currently affect approximately 300,000 pregnancies worldwide. The prevalence of NTDs has decreased in the US since 1998, when the FDA set folate fortification requirements in enriched cereal-grain products; nonetheless, the risk of having a NTD-affected pregnancy is up to threefold higher for obese mothers than for normal weight mothers. To examine associations between folate biomarkers and obesity status, we performed a secondary analysis of baseline folate concentrations and body composition parameters from a recent study conducted on normal weight and obese women of childbearing age. While accounting for each participant's total folate consumption, overall calorie intake, and age, we determined a significant inverse relationship between body mass index (BMI) and serum folate and a direct relationship between BMI and red blood cell folate. This evidence suggests that the current RDA for non-pregnant women (400μg DFE [dietary folate equivalents]) should be revised and adjusted based on BMI measurements to support NTD risk reduction.

Where Chemistry Meets the Classics: First-ever Modern Scientific Analysis of Pompeiian Polychrome Sculptures

Richard Weimar III
Dr. Tina Salguero, Chemistry, Franklin College of Arts & Sciences
Dr. Mark Abbe, Lamar Dodd School of Art, Franklin College of Arts & Sciences

The white marble of ancient Greek and Roman sculpture and architecture was originally vividly colored. This polychromy was first demonstrated with the 'Treu Head' in 1889; since then, archaeologists' and historians' view of the ancient West has become much more colorful. However, until the development of modern scientific technologies, the analysis of these masterpieces was limited largely to stylistic and historical approaches. Despite the huge wealth of information and insight that becomes available with state-of-the-art analytical chemistry techniques, their application to archaeological artifacts has not been refined or widely applied. The highly multidisciplinary studies described in this work–The Oplontis Project and The Orpheus Relief Project–seek to establish scientific analyses as integral to further advances in the fields of archaeology and art history. In doing so, we seek to set a new, high standard for future contributions and to robustly establish a fruitful intersection between the physical sciences and the humanities. This particular work encompasses our technical findings on the first-ever scientific analysis of polychrome statues in the Gulf of Naples, along with findings on an ancient polychrome Roman relief currently on loan at the Georgia Museum of Art. The techniques used include micro-Raman spectroscopy, near infrared luminescence spectroscopy and polarized light microscopy. Through our results, we can accurately appraise the sculptures' authenticity, sociopolitical significance, and historical context. Additionally, we can inform conservation methods and generate virtual replicas that are faithful to the cultural

heritage of one of the most influential civilizations ever known.

Justice for All: The Vitality of Addressing Judicial Structures during Reconstruction Period

Patrick Wheat
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After an ethnic conflict, a state undergoes a reconstruction period that can be characterized by either a general increase or decrease in hostilities between different factions. If the increase in hostilities is not addressed, it is likely that war can break out again in the state. To ensure that there is not an increase in hostilities, the role of the government during this period should be focused on the reestablishment of an unbiased judicial system and law enforcement agencies. The reason for this is because during the first few months of reconstruction, ethnic factions will likely be hostile and unwilling to accept opposing ethnic factions. Through the judicial system, the government will be able to establish a "rule of law" that is fair to all ethnic groups. By doing this, the government should be able to act as a mediator by addressing individuals, not ethnic groups, who committed crimes against each other. This will allow for a better chance of reconciliation between ethnic groups during this period as a result. To demonstrate this possibility while also discussing potential obstacles within both the government and society to effectively reconcile ethnic factions, I will be discussing the situations in several nations, including Bosnia and Herzegovina, Rwanda, and Kyrgyzstan.

Investigation of the Mechanism of Bile Acid-induced Prostate Cancer Cell Death

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Bile acids mediate the digestion and absorption of fats and fat-soluble vitamins; however, pathological increases are associated with choleostasis and cell death. Recent studies show that high concentrations of bile acids can induce apoptosis in several cells, including cancer cells, by mechanisms that are not fully understood. The goal of this study was to determine the mechanism of toxicity of three different bile acids (chenodeoxycholic acid, deoxycholic acid, and lithocholic acid) in prostate cancer cell lines (PC-3, LNCaP, and DU-145). Based on reports that bile acids increase the expression of inflammatory enzymes called secretory phospholipase A2 (sPLA2), we tested the hypothesis that these enzymes regulate the mechanisms of bile acid-induced cell death. Analysis of sPLA2 expression using quantitative PCR showed that several sPLA2 isoforms were expressed in PC-3, LNCaP and DU-145 cells, including Group IB, IIA, V and X sPLA2. Nevertheless, treatment of cells with the sPLA2 inhibitor LY311727, prior to exposure to bile acids, did not alter MTT staining compared to cells exposed to bile acids alone. Similar results were seen with the calcium-independent PLA2 (iPLA2) inhibitor bromenol lactone. Other reports suggested that bile acids had a role in oxidative stress, so the antioxidants glutathione, N-acetyl cysteine, and ascorbic acid were tested. Dosing the cells with these antioxidants prior to bile acid exposure did not alter MTT staining. Collectively, these data show the novel finding that bile acids can induce toxicity to prostate cancer cells and suggest that neither sPLA2, iPLA2, nor oxidative stress mediates the mechanisms of cytotoxicity.

Abstracts

Comparison of Two Biocatalysts for Ethanol Production from Pectin-rich Biomass with Varying Levels of Industrial Processing

Travis Williams, Jr.
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Pectin-rich biomass is an overlooked alternative energy source in the USA. Pectin-rich biomass includes spoiled or rotten fruits, like cull peaches, and waste products from juice and sugar production, like citrus waste (CW) and sugar beet pulp (SBP). This set of experiments examined how varying levels of industrial processing influenced the carbohydrate composition and ethanol production of pectin-rich biomass through the use of two biocatalysts. The biocatalysts used were the yeast, *Saccharomyces cerevisiae* XR122N and the engineered bacterium, *Escherichia coli* LY40A. First, the composition of each biomass was analyzed. The biomass with the least amount of industrial processing, cull peaches, contained a higher concentration of monomeric sugars. The biomass with the most industrial processing, SBP, contained the least amount of free sugars and the intermediately processed CW fell somewhere in between. The amount of available monomeric sugars decreased and the concentration of polymeric biomass increased significantly as the amount of industrial processing of the biomass increased. Next, fermentations with *S. cerevisiae* XR122N were compared to fermentations with *E. coli* LY40A. The industrially processed biomasses, SBP and CW, were best fermented by *E. coli* LY40A. The unprocessed peach biomass was best fermented by *S. cerevisiae* XR122N. Finally, the optimal enzyme loading for fermentation of cull peaches was studied using 15% w/v peach pomace and varying amounts of commercial enzymes. The lowest enzyme loading which still produced the maximum amount of ethanol was 1.88 FPU of cellulase/g dw, 7.50 PGU of pectinase/g dw, and 6.25 CBU of cellobiase/g dw.

The Role of Technology in Early North American Pacific Colonialism

William Willoughby IV
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This paper asks one central question: What was the role of technology in early colonialism on the West Coast? Within this context, a series of secondary questions arise: Was it particularly influential? Did it provide a significant advantage to imperialists in conquering new territory? Research methods focused on independent reading, with an emphasis on primary source documents. A common presumption in the historiography of imperialism is that sophisticated European technologies were superior to native technologies, and that this superiority ensured domination. However, in the case of the eighteenth century in the North American Pacific, this reasoning is problematic for two reasons. First, the conflation of sophistication and superiority is presumptuous and often incorrect. Second, given the remoteness of this region, Europeans often found themselves limited not necessarily by technological capacity but by what was available or affordable. The limited availability of European goods increased the importance and use of native technologies, which were adapted to the local environment and made use of locally available materials. Consequently, Europeans relied on native technologies despite preference for their own. In some cases they discovered native technologies to be more useful. In short, European technologies were far less important than we have understood.

Abstracts

Stories of Roswell, Georgia: A Sociolinguistic Study of Narrative Structure

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Labov & Waletzky in 1967 established a framework for understanding spoken narrative from a sociolinguistics perspective, which breaks down a story into seven different parts according to function: abstract, orientation, evaluation, temporal juncture, complicating action, resolution, and coda. They established that these structures are employed predictably in spoken narrative, and appear in the above order. In 2010, Hettel & Bounds combined this methodology with corpus linguistics and complexity theory for fresh insights into how speakers tell stories. They found Labov & Waletzky's proposed sequence of structures was preserved as a generalization across speakers, but was highly variable at the individual level. In my own research, I have used Hettel & Bounds' methodology to further investigate the variable nature of narrative structure in English, as well as to address Spanish. Since fall 2011, I have been researching with the Roswell Voices Project, a civic-academic partnership between the Convention & Visitors Bureau of Roswell, Georgia, a northern edge city of Atlanta, and the University of Georgia. Its purpose is to describe the Roswell community culturally and linguistically. As a part of this objective, I have endeavored to extend the scope of the Project to encompass Roswell's Latino community, which now comprises a quarter of the city's overall population of 100,000. I interviewed 26 Latino community members, from which I selected a sampling plan of eight to transcribe and annotate for narrative structure. Each phrase of each speaker's narrative, subdivided by word, is labeled as fulfilling one of the narrative functions delineated by Labov & Waletzky (1967). Results indicate that narrative structure is more variable than originally supposed, and that the paradigm functions differently in Spanish than in English.

Serum Free Cortisol Fraction and Insulin Concentration in Normal Horses, Obese Horses and Horses with Pituitary Pars Intermedia Dysfunction

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Cortisol has been theorized to play a role in the development of endocrinopathic laminitis and insulin resistance, important complications of Pituitary Pars Intermedia Dysfunction (PPID) in horses. Measurement of total serum cortisol concentration, which is not typically increased in affected horses, quantifies both protein-bound and free cortisol, though only free cortisol is biologically active. The objectives of this study were to compare free cortisol fraction (FCF) between horses with PPID and age-, sex- and season-matched healthy horses, and to determine if FCF and hyperinsulinemia are correlated in PPID and obese horses. Body condition scores (BCS) were determined and blood was collected in October, January, April, and July from 57 healthy adult horses. Archived frozen serum samples were obtained from 20 horses diagnosed with PPID and from 19 obese horses. Serum insulin and total cortisol concentrations and FCF were measured with previously validated radioimmunoassay, chemiluminescent immunoassay, and ultrafiltration/ligand-binding assay respectively. In healthy horses, there was a significant association of increasing BCS with increasing insulin concentration and increasing FCF ($P < 0.0001$). Total cortisol concentration was not significantly different between PPID and healthy horses, but both insulin concentration and FCF were significantly higher ($P=0.011$ and $P=0.0004$) in PPID horses than healthy horses. In obese horses, FCF was significantly

higher in hyperinsulinemic horses than normoinsulinemic horses (P = 0.037); there was no difference in PPID horses (P = 0.6341). These data suggest that cortisol binding dynamics may be altered in horses with obesity and PPID, resulting in increased free cortisol.

Clarification of the Mechanism of *Aliivibrio fischeri* HutW, a class C Radical SAM Methyltransferase Enzyme

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Aliivibrio fischeri is capable of utilizing external heme as an iron source. In iron-limiting conditions, the bacterium expresses a heme utilization (hut) operon that codes for three proteins, HutW, HutX, and HutZ, homologs of which are necessary for the growth of *Vibrio cholerae* with heme as the sole iron source. The precise roles of these proteins in heme utilization in *A. fischeri* are unclear. HutW contains a core domain characteristic of radical SAM enzymes, with a specialized [4Fe-4S] cluster coordinated by three cysteine residues in a conserved CxxxCxxC motif, as well as a distinct C-terminal domain. Recent work suggests that HutW is a member of the Class C radical SAM methyltransferase (RSMT) family, a group of enzymes with an unknown mechanism. RSMTs are involved in a range of reactions that utilize SAM as the source of a radical, generated by reductive cleavage of S-adenosyl methionine, and either another SAM molecule or methylcobalamin as a methyl donor. Class A RSMTs use two SAM molecules and proceed via a methylthioether intermediate, while class B enzymes are cobalamin-dependent. HutW has methyltransferase activity in the presence of SAM, heme, and a reductant. This study proposes to clarify the mechanism of HutW through site-directed mutagenesis. Substitutions of the cluster-coordinating cysteines will confirm the importance of the cluster while substitutions of other cysteines will clarify whether the reaction proceeds by a class A-like mechanism. A greater understanding of HutW's mechanism could reveal a novel methyltransferase reaction and potentially allow for the development of enteric pathogen-specific drugs.

The Effect of Thiamine Supplementation on Transketolase Activity in Cancer Cells

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The increased glucose uptake observed in cancer cells parallels rapid tumor growth. Cancer cells preferentially undergo fermentative glycolysis in the presence of oxygen, a phenomenon termed the Warburg effect. Alterations in the activity and regulation of glycolytic enzymes cause the accumulation of intermediate metabolites, such as fructose-6-phosphate (F6P) and glyceraldehyde-3-phosphate (G3P). Excess F6P and G3P are shunted into the non-oxidative pentose phosphate pathway (PPP) for the production of nucleic acids essential to cancer cell proliferation. Non-oxidative PPP substrate flux is regulated by transketolase (TKT), a thiamine-dependent enzyme. Compared to normal cells, cancer cells are more dependent on the non-oxidative PPP. Previous studies have shown that the non-oxidative PPP provides at least 85% of nucleic acids for malignant cells. Because transketolase is a thiamine-dependent enzyme, we hypothesize that thiamine regulates glucose consumption, non-oxidative PPP substrate flux, and transketolase expression in cancer cells. Results from glucose assays demonstrate that thiamine supplementation stimulates glucose utilization. Preliminary radioactive glucose labeling experiments reveal that thiamine increases non-oxidative PPP substrate flux. Evidently, thiamine supplementation enhances transketolase

activity, which may promote cancer cell growth and proliferation.

Relationship between Number of Years in Animal Health Practice and Recognizing Pain

Courtni Young, CURO Honors Scholar
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The gold standard for diagnosing pain in people is by self-report. Unfortunately for veterinarians, their patients are incapable of communicating with them. Several scales have been constructed to help aid veterinarians in their analysis of determining the level of pain their patients are in. The hypothesis of this study was that sophomore veterinary students would be more able to detect painful patients than freshmen veterinary students. Volunteer first and second-year undergraduates at the University of Georgia were shown short clips of dogs recovering from surgery and asked to rate how much pain, if any, the dogs were in. After collecting the data, the agreement between participants was tested using the Fleiss-Kappa and the Bland-Altman plot. Results from our data show there is low agreeability among the participants. The highest agreement score between freshmen was 0.113939 while the highest agreement score among sophomores was 0.078086. Volunteers owning several pets prior to the research also showed little agreeability, as did those volunteers who owned at most one pet. There was also little agreeability between the Visual Analogue Scale and the Numerical Rating Scale, with the average correlation between the two scales being 0.2594. Agreeability between the Numerical Rating Scale and the Glasgow Scale was very low, with the average correlation between the two scales being 0.0494. Based on these findings, we can conclude that there is little, if any, reliability of the VAS, the NRS, and the Glasgow scales between each other and little agreeability between the different undergraduate levels.

Mikhail Bulgakov's Mysteries: The Personas, Metaphors, and Names of the Novel *The Master and Margarita* Analyzed in a Historical Context

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Brilliant Russian writer Mikhail Afanasyevich Bulgakov started writing *The Master and Margarita*, his greatest masterpiece, in 1928 and continued revising it until 1940, the year of his death. *The Master and Margarita* intertwines three stories: one about Pontius Pilate and Yeshua in Jerusalem, one about the chaos and disorder that ensues when the devil Voland and his entourage visit atheistic Moscow, and one about the romance between Master and Margarita. This paper analyzes the two revolutions in Bulgakov's novel: the revolution struggling to create the Christian faith in Jerusalem and the revolution striving to destroy that same faith in 1930s Soviet Russia. Bulgakov skillfully interweaves his anti-Soviet ideas under metaphors revealing the degraded sociopolitical morale and insanity behind the facade of a nation. Simultaneously, he deepens the complexity and interrelatedness of the plot by choosing suggestive personas and names. This research provides some new perspectives about the meaning of Bulgakov's chosen personas, metaphors, and names and explores the fears and daily tragedies of Soviet life. These interpretations come from the scrutiny of *The Master and Margarita*, Bulgakov's life, and the culture of the Soviet Union.

Understanding Ecological Networks: A Mathematical Approach to Ecosystem Balancing and Analysis

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New methods of mathematical network analysis have brought vast new potential to

the exploration of ecosystems. In order to perform such analysis, however, data collected by ecologists from the field must be converted into a useful mathematical form. The purpose of this study was twofold: to explore the mathematical definition of "distance" between two ecological networks and to develop a minimal-change balancing method that would account for error in field-collected data. Based on the flux decomposition of a network, the distance metric was defined to be the magnitude of a vector between two flux coefficient vectors representing two unique steady states of the same network. Based on application of this distance metric to several steady states across three different networks, the study showed that this distance metric exhibits unique geometry determined by network structure, potentially leading to further understanding of ecosystem dynamics. The network balancing method is based on the desire to generate a steady-state network from field-collected data that suggest an impossible unsteady-state network. Utilizing the stoichiometric matrix of the network and a flow value vector quantifying the network, it was shown that a constrained minimization problem yields a steady-state network with the minimal possible change to the collected data. Based on testing in MATLAB using three different networks, the amount of change required to achieve a steady state is less than any other known existing method. This new method shows promise as a data correction agent for all ecologists to more effectively analyze their ecosystem of interest.

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