

Southern Illinois University Carbondale

**OpenSIUC**

---

Undergraduate Creative Activities and Research Undergraduate Research and Creative Activities  
Forum Abstract Books Forum

---

4-2013

## 2013 Abstract Book

Undergraduate Research Forum

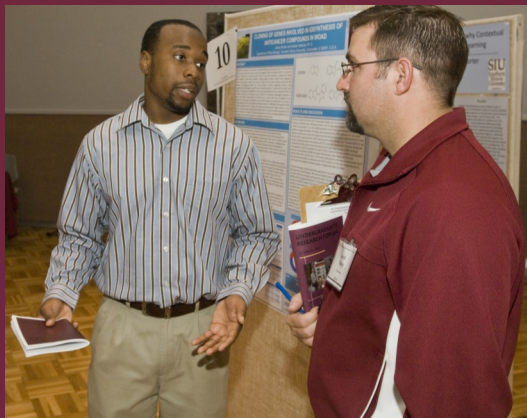
Follow this and additional works at: [https://opensiuc.lib.siu.edu/curca\\_forum](https://opensiuc.lib.siu.edu/curca_forum)

---

This Article is brought to you for free and open access by the Undergraduate Research and Creative Activities Forum at OpenSIUC. It has been accepted for inclusion in Undergraduate Creative Activities and Research Forum Abstract Books by an authorized administrator of OpenSIUC. For more information, please contact [opensiuc@lib.siu.edu](mailto:opensiuc@lib.siu.edu).

# Undergraduate Research Forum

2013 Abstracts



**SIU**  
Southern  
Illinois  
University  
CARBONDALE

Student Center  
Ballrooms A & B  
April 8, 2013

**"Engaging in research creates** new and exciting

learning opportunities beyond the classroom for our undergraduate students. Research is about finding answers, and as students are learning, they also are creating new knowledge. These enriched problem-solving experiences will better prepare them to compete in the global society. The enthusiasm and dedication of our students and their faculty mentors inspire the entire campus community."

*—Rita Cheng, Chancellor*

**"One of the great benefits** of attending a research

University such as SIU Carbondale is that undergraduate students who become involved in research activities work in a professional environment that also involves graduate students and faculty, and gain problem-solving experience that is prized by employers. We are very pleased to offer our students enhanced opportunities of this type through the REACH program."

*—John Koropchak, Vice Chancellor for Research and Graduate Dean*

**"We are extremely proud** of our undergraduate research pro-

grams at SIU. From first-year students to seniors, students engaged in these programs tend to succeed at a higher rate. The knowledge acquired, collaborations built, and skills developed support a positive supportive learning environment and give students an advantage in pursuit of professional careers and graduate school."

*—John W. Nicklow, Provost and Vice Chancellor for Academic Affairs*

# **Undergraduate Research Forum**

**April 8, 2013**

**Southern Illinois University Carbondale**

---

## **Program**

Poster Judging Sessions: 8:30 a.m.—12:30 p.m.

Public Viewing Session: 1:00 p.m.—3:00 p.m.

Award Presentations: 3:00 p.m.

## **REACH Director**

Vanessa Sneed, OSPA

## **Organizer**

Lori Foster, OSPA

## **Sponsors**

Office of the Provost

Office of Sponsored Projects Administration (OSPA)

The Sustainability Council

SPEAR (Students Promoting Educational Advancement and Research)

## **Poster Judges**

Frank Anderson, Zoology

Aldwin Anterola, Plant Biology

Dona Bachman, University Museum

Alejandro Caceres, Foreign Languages  
& Literatures

Cameron Carlson, Educational Admin &  
Higher Education

Alessandro Catenazzi, Zoology

Joe Cheatwood, Anatomy

Lizette Chevalier, Civil &  
Environmental Engineering

Garth Crosby, Technology

Mallika Dasari, Chemistry &  
Biochemistry

Saran Donahoo, Educational Admin &  
Higher Education

Leslie Duram, Geography

Buffy Ellsworth, Physiology

Ahmad Fakhoury, Plant, Soil &  
Agricultural Systems

Derek Fisher, Microbiology

Carl Flowers, Rehabilitation Institute

Jane Geisler-Lee, Plant Biology

Matthew Giblin, Criminology &  
Criminal Justice

David Gibson, Plant Biology

Wayne Glass, Office of Sponsored  
Projects Administration

Pam Gwaltney, University Honors

Michael Hoane, Psychology

Karen Jones, Animal Science,  
Food & Nutrition

Jyotsna Kapur, Cinema &  
Photography

Linda McCabe Smith, Associate  
Vice Chancellor for Institutional  
Diversity

Walter Metz, Cinema &  
Photography

Jeff Myers, Technology Transfer

Jane Nichols, Rehabilitation  
Institute

Michael Olson, Kinesiology

Kyle Plunkett, Chemistry &  
Biochemistry

Jared Porter, Kinesiology

Greg Rose, Anatomy

Antje Rusch, Microbiology

Patricia Saleeby, Social Work

Kris Schachel, Sustainability,  
Office of Vice Chancellor for

Administration & Finance

Rhetta Seymour, McNair Scholars

Sylvia Smith, Animal Science,  
Food & Nutrition

Matthew Therrell, Geography &  
Environmental Resources

Deborah Tudor, Mass

Communication & Media Arts

Robin Warne, Zoology

## **Student Participants**

1. Megan K. Abell.....
2. Suzanne Abell.....
3. Cheyenne M. Adams.....
4. Shant B. Alexanian.....
5. Benjamin Bartholf.....
6. \*James Bender.....
7. Steven Blair &  
Jessica Suda.....
8. \*William Blankenship.....
9. Kevin Bradley.....
10. Erin Brown.....
11. \*Sarah Buto.....
12. \*Blake Cain.....
13. Kaci Clark.....
14. Brittany Dickson.....
15. Ashton Dixon.....
16. Steven Ebers.....
17. \*Benjamin Elliott &  
\*Samuel Martin.....
18. \*Eric French.....
19. Adolfo Frias.....
20. Sabrina Gerzel.....
21. Lacey Gibson.....
22. Lacey Gibson .....
23. Amber Gilliam, Farah I.B.  
Jayos, Ashley Wells,  
Nicolette Winn, & Yara S.  
Artis.....
24. Mercedes Gomez Jacobo.....
25. \*Zachary Guilford.....
26. \*Jason Gumbel.....
27. Sydney Harberberger.....
28. Renee Hazen.....
29. Steven Jesselson.....
30. \*Cody Jordan.....
31. Samuel Jordan.....
32. Brock Kabat.....
33. \*Bryan Quah Kah Ming.....
34. Anna Kallal.....

## **Mentors**

Mary L. Bogumil  
Peter B. Smith  
Brian C. Small  
Eugene Talley  
Bryan Kelso Crow  
David Gilbert  
  
Ning Weng  
Mengxia Zhu  
Amber L. Pond  
Alejandro Caceres  
Thomas J. Kidd & Hong Zhou  
Andrew A. Sharp  
Paul Etcheverry  
Stephanie Clancy Dollinger  
Joan Davis  
Prema Narayan  
  
Scott E. Ishman  
Eric Jacobs & Michael Hoane  
Derek Fisher  
Cameron Carlson  
Dale B. Hales  
Dhitinut Ratnapradipa  
  
Meera Komarraju &  
Dustin R. Nadler  
Justin Schoof  
Marjorie Brooks  
Buffy Ellsworth  
David Gilbert  
Michael Lydy  
David Gibson  
Clayton Nielsen  
Eric Jacobs  
Buffy Ellsworth  
Samuel Ma  
Kathryn Martin

[cont.]

## **Student Participants**

35. Deanna Keller.....
36. Kayla Klugow.....
37. Austen Knapp.....
38. Andrew Lambert.....
39. Joshua Lambert.....
40. \*Michelle Lanteigne.....
41. Phi Le.....
42. Duane Lickteig.....
43. DanYale Locke .....
44. David Lynch.....
45. Yue-Huan Lyu.....
46. \*Lonnie Mann.....
47. Benard McKinley, Jr.....
  
48. Victoria Mendez.....
49. Jenny Mick.....
50. Caitlin Moliske &  
Brittney Meador.....
51. \*Travis Neal.....
52. Daniel Olsen.....
53. Arzanah B. Opon.....
54. \*Justin Ostrowski.....
55. Lauren Ovca.....
56. Arrealle Owens.....
57. Omari Owens.....
58. \*Ivan Perez &  
\*Kyle Goetzelmann.....
59. Madeleine Pfaff.....
60. \*Joshua Pogue.....
61. \*Lauren Pruemer.....
62. Erika Putz.....
63. Rebecca Rea.....
64. Tanner Rehnberg.....
65. Lilith Reuter-Yuill.....
66. Roniqua Roundtree.....
67. Allison Rump.....
68. Alyssa Saylor.....
69. Kelly Schmidt.....
70. Kevin Schrader.....

## **Mentors**

Eduardo Gastal  
Allison Joseph  
Joseph L. Cheatwood  
Gretchen R. Dabbs  
Benjamin Rodriguez  
Michael Lydy  
Karla Horton  
Vjollca Konjufca  
Mavis Adjei  
John Jackson  
Kyle Plunkett  
Aaron Scott  
Beverly Love  
Stephanie Clancy Dollinger  
& Eric Jacobs  
Jane Swanson  
  
Edward Brunner  
David Gibson  
Sprynos Tragoudas  
Kenneth O. Simpson  
Jared Porter  
Shannon McDonald  
Saran Donahoo  
Aldwin Anterola  
  
Yanna Liang  
Eric Schauber  
Colleen Scott  
Lilly Boruszkowski  
Thushari Jayasekera  
Lorilee Huffman  
Joseph L. Cheatwood  
Joel Ringdahl  
Lisabeth DiLalla  
Vjollca Konjufca  
Lisabeth DiLalla  
Buffy Ellsworth  
Dale B. Hales

[cont.]

<b><u>Student Participants</u></b>		<b><u>Mentors</u></b>
71.	Morgan Schulte .....	Jon Schoonover
72.	Ravyn Shelton.....	Kathryn Martin
73.	Cassandra Showmaker.....	James A. MacLean
74.	*Ethan Snively.....	Jon Schoonover
75.	*Alexander T. Sougiannis..	Juliane P. Wallace
76.	Frank W. Soveg.....	Aaron Turkewitz, University of Chicago
77.	*Frank W. Soveg.....	Agustin Jimenez
78.	Ometere Topah & Hiral Patel.....	Aldwin Anterola
79.	Jacob Walker.....	James Mathias
80.	William S. Welling.....	Yanyan Sheng
81.	Jill Winkelman.....	Nancy Mundschenk
82.	Nicolette Winn, Ashley Wells, Farah I.B. Jayos, Amber Gilliam, & Yara S. Artis.....	Meerea Komaraju & Dustin R. Nadler
83.	*Austin Wood & *Matthew Wozniak.....	Lilly Boruszkowski
84.	*Calvin Zimmermann.....	Rachel Whaley

\*Recipient of a 2012-2013 Undergraduate Research/Creative Activity Award from the REACH Program

## What Students Say about Undergraduate Research:

"It's not somebody else's research, it's my own, which is really nice. You don't have to have somebody tell you what to focus on or what to do. It's a great opportunity to be able to put yourself in your field and get started. It's really helped me starting my career." -- Misty McElyea

"I view this project as part of a bigger effort of trying to find out how all of life is created. There may not necessarily be an immediate or obvious benefit; it's not going to cure a disease or it's not going to make anyone money. It's just one of those questions that I think people are curious about, like how does life all tie together in the end. I feel like this project will contribute to that. And, this has given me a really good opportunity to figure out if this is the major I really want to do, instead of going through four years and not getting any real lab experience and hoping that I would like it. That's really been the main benefit for me—experience and exposure to my field." -- Nicholas Defreitas

"I was a C-average student in high school, but I've blossomed at SIU," said McNair Scholar Miranda Griffith of her undergraduate research experience.

"This opportunity to do real research as an undergraduate has enforced in me that this is indeed what I want to do with my life." --Sara Reardon

"I have learned more from doing research than in any class I've taken. Hands-on learning stays with you much better than learning from lectures and books. Research is slow and frustrating but the rewards and excitement of discovering new scientific information are beyond anything I could have imagined. No matter what I do in life, I will always be able to use the tools of research, especially the critical-thinking and problem-solving skills that are essential for success." --Renee Lopez-Smith

"This experience confirmed my ability to tackle a large project and to meet a deadline, but more importantly I was able to participate in something I enjoyed and also educate the public about a growing problem in our waterways." -- Matt Wegener



**Megan Katherine Abell**

Department of English

*The “Counter-Charm” of Maternal Love: A Comparative Case Study of Lily Potter and Merope Gaunt*

Although scholars have offered an extensive analysis concerning the female characters of the *Harry Potter* series, such as Hermione, Professor McGonagall, and Molly Weasley, it is Lily Potter and Merope Gaunt, the mothers to the hero and villain of the series, and, by extension, the role of motherhood that is often overlooked in critical debate. Consequently, I argue that it is through an analysis of their roles as mothers that we ascertain the imperative impact of their mothering on their children’s development. While Merope’s selfish death and lack of maternal love for Tom Riddle influenced him into the darker side of magic, it is Lily’s sacrifice and maternal love for Harry that ultimately allowed him to bring about the defeat of Lord Voldemort. The causal link between Lily’s sacrifice and Voldemort’s ultimate demise is found, not simply through her reversion of the *Avada Kedavra* curse, but through her maternal relationship with Harry. I argue that it is by offering a case study analysis grounded in current empirical research (which measures the brain development of children who grow through the early stages of infancy with and without a mother), as well as supported by Jungian theory, that we read of the importance of the motherhood of Lily and Merope that form the respective Jungian mother archetype. While Merope and Lily are always in the background of the series, it is their “mother love,” or lack thereof, that is realized as the central focus to the novels and their sons’ (pre)dispositions.

## Suzanne Abell

### School of Architecture

#### *The Evolution of Sustainable Architecture: Historical Precedents, Typologies, and Influences on Present Day Sustainable Design Practices*

Long before notions such as "green" and "sustainable" were ever understood, environmentally focused architectural design elements were commonly found and developed throughout history. Even some of the earliest civilizations show unmistakable evidence of insightful and ecologically cognizant building techniques. The focus of this research is to explore how modern, sustainable design developed into what it is today. As new scientific discoveries emerge and the variety of the Earth's natural energy resources are studied and evaluated, sustainable design and materials science continue to gain importance in architectural technology at all levels. Through the use of graphic representations, diagrams and three-dimensional features, I catalog these historically significant steps in human environmental awareness and its effect on our dwellings through time. The designs of both the past and present are evaluated by efficiency, energy usage, aesthetics and architectural significance. Items such as natural updraft ventilation, filtered light, solar shading, material thermal conductivity and other passive systems are most often emphasized. By organizing this architectural history and discovering which building methods have set a precedent for modern day energy-efficient design, not only do I have greater understanding of the concepts underlying the most current "green" technologies, but I can now begin to theorize and predict how sustainable forms and functions may evolve in future constructs.

**Cheyenne M. Adams and Brian C. Small**

Center for Fisheries, Aquaculture, and Aquatic Sciences  
Departments of Zoology and Animal Science, Food, and Nutrition

*Saline Aquifers Provide a Unique Opportunity for Mariculture in Illinois*

Current carbon dioxide sequestration practices may require removing water from saline aquifers to relieve pressure. This practice could provide a sustainable source of saline water for mariculture in Illinois, while simultaneously mitigating global climate change. The objective of this research was to assess the feasibility of rearing fish in saline aquifer water. To test this, fish production in 10 ppt saline water prepared with a commercial sea salt (Instant Ocean) was compared to production in synthetic Aquifer water, also at 10 ppt. Four tanks per treatment were each stocked with twenty Striped Bass averaging 92.4 mm and 8.5 g. Water quality analysis was done on a weekly basis for both systems. Percent weight gain was not statistically different between systems at eight weeks ( $P=0.11$ ). However, fish in the Instant Ocean system had higher mean feed efficiency (111.4%) than the Aquifer system (91.5%) at eight weeks ( $P=0.01$ ). This corresponded to lower feed consumption ( $P=0.05$ ) in the Instant Ocean system (335 g) than in the Aquifer system (370 g). By twelve weeks, there were no statistical differences ( $P>0.1$ ) for percent weight gain, feed efficiency, or feed consumption between systems. Mean total ammonia level was lower ( $P=0.0001$ ) in the Instant Ocean system (0.51 ppm) than the Aquifer system (3.97 ppm) throughout the study. These results indicate the Aquifer system had less effective biological filtration, probably due to the composition of the salt. Therefore, modification of the Aquifer salt composition would likely be necessary to increase fish production further.

**Shant Alexanian**

Departments of Automotive Technology and Mechanical Engineering

*Hybrid Forced Induction Systems: The Best of Both Worlds.*

Fuel economy is no longer just a selling point to automotive manufacturers. It has become a legal necessity. With the corporate average fuel economy (C.A.F.E) standard increasing at an exponential rate, manufacturers are struggling to increase fuel efficiency without sacrificing drivability and power. Turbo charging has become a popular method of increasing overall power and fuel efficiency, but it has its draw backs. It actually decreases power, efficiency, and drivability at lower RPM due to turbo lag. Supercharging is a great way to improve low RPM fuel efficiency and power, but opposite to turbo charging, supercharging reduces high RPM fuel efficiency. This system incorporates the benefits of both turbo charging and supercharging, without compromising for the draw backs of both systems. This systems utilizes an electronically controlled supercharging system, which can be engaged on demand, and eliminates turbo lag. When the turbocharger reaches optimum operating speeds, the supercharger is electronically deactivated and the turbocharger takes over. This will increase horsepower and fuel efficiency across the entire RPM range. What makes this system truly unique is the fact that it is all one unit, saving space and materials in the engine compartment. It is the first of its kind, and has the potential to change forced induction systems as we know it.

**Benjamin Bartholf and Bryan Crow**

Department of Psychology

*Perceptions of Sexual Occurrence Within Monogamous Relationships  
and Perceptions of General Relational Satisfaction*

Sexual frequency has been used several times to weigh the amount of sexual intimacy within a relationship. Those raw numbers do not take into account personal preference. This study aimed to define the possibility of one's perception of their sexual occurrence, rather than raw frequency, as a variable could have an affect on relational satisfaction. Feelings of commitment and love, which have been found to stem from sexual relations, increase the involvement of communication and oxytocin within the relationship. It could be possible that a gap between desired and attained sexual frequency distance partners within a relationship. An over or undersexed person can feel used or underappreciated respectively. I hypothesize that a person's perception of their frequency of sexual intimacy affects sexual satisfaction, and by extension general relational satisfaction more so than the frequency of sexual activity engaged in.

This study was conducted using a reformatted published survey to allow ease of access online. 147 participants were collected at both the graduate and undergraduate level.

**James Bender<sup>1</sup>, Herman Diggs<sup>1</sup>, Matthew Picchietti<sup>1</sup>, Ryan Coppins, David G. Gilbert<sup>1</sup>, and Gregory Rose<sup>2</sup>**

<sup>1</sup>Department of Psychology, <sup>2</sup>School of Medicine

*Covariations and Differences in EEG and fMRI Neural Activation Patterns during Cue Reactivity*

The goal of this study was to use simultaneous acquisition of high-density (128 channel) electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) neuroimaging data to characterize brain responses across two tasks: an oddball task and a finger tapping task. EEG's excellent temporal resolution ( $< 5\text{ms}$ ) allows for the quantification of rapid event-related potentials (e.g., late positive potential) but has relatively lower spatial resolution, whereas the blood-oxygen-level-dependent (BOLD) response of fMRI has excellent spatial resolution but relatively lower temporal resolution ( $> 1000\text{ ms}$ ). Thus, the combination of fMRI BOLD and EEG measures of brain activity may provide greater temporal and spatial resolution than either modality alone and could lead to important insights into the dynamics of the neural response. Recent advances in technology allow the mapping of EEG current activation sources onto the cortex in 3-dimensional space using personalized high-resolution anatomical MRI images. EEG frequency- and time-locked activity within these sources of interest was then correlated with fMRI activity. EEG and fMRI measures identified similar co-occurring patterns of activation in the cortical regions of interest, while fMRI allowed better characterization of subcortical areas across both tasks. Coupling of the EEG and fMRI activity revealed additional information about the temporal dynamics of the two signals.

**Steven Blair, Chase Cooley, Jessica Suda, and Nick Turner**

Department of Electrical and Computer Engineering

*Self-Sustaining Autonomous Underwater Vehicle*

Recent advances in nautical exploration via remotely operated vehicles have been useful in revealing our oceans depths, but they are still costly to operate – requiring significant man-hours due to constant crew involvement and a support ship which can cost upward of \$17,500 a day to operate. Whether it be to unlock the secrets of unexplored ocean territory, to monitor changing sea temperatures, or to watch pollution in ecosystems near industrial harbors, there is a need for technologies that will open mankind's view into the underwater world while minimizing the need for trained staff, reducing the occupational hazard of visiting areas of high pressure and low visibility, and allowing for modularity to fit new jobs or comply with regional laws.

A proposed solution is the development of a self-sustaining autonomous underwater vehicle (AUV) capable of collecting large amounts of research data at a reduced cost by removing human interaction. Towards this end the AUV must be able to both operate autonomously for a prolonged period of time and generate its own electricity. The processing power of the energy efficient Intel Atom, the versatility and ruggedness of flexible solar panels, and the data presented by low cost inertial navigation units provide an effective answer to these problems. Proper design of the chassis used to mount and protect this equipment will also provide a platform adaptable to the specific needs of diverse users. This study presents the groundwork and a prototype for a vehicle that accomplishes these specified goals and will be accessible to an organization of any size.

**William Blankenship**

Department of Computer Science

*Demonstrating the Application of the CloudSim Development Framework towards Job Scheduling Algorithms Developed in Southern Illinois University's High Performance Computing Laboratory*

CloudSim is a Java library designed to simulate both cloud and high performance computing (HPC) infrastructures. CloudSim was developed at the University of Melbourne to simplify the process of testing algorithms developed for use in HPC and cloud infrastructures without the high cost associated with testing on physical hardware. This research is concerned with exploring the usefulness of the CloudSim development framework to SIU's HPC Lab by developing test simulations using the package. Novel contributions to the HPC lab that have come from this project include a task graph generator, a file format for specifying task graphs that can be imported into CloudSim, and a file format for specifying CloudSim entities. Research is still being conducted on using the platform to develop a simulation for testing the EARES-D job scheduling algorithm designed in our HPC lab.



**Kevin S. Bradley<sup>1</sup> and Amber L. Pond<sup>1,2</sup>**

<sup>1</sup>Department of Anatomy, Southern Illinois University School of Medicine. <sup>2</sup>Department of Medicinal Chemistry and Molecular Pharmacology, Purdue University

*Expression of the MERG1a K<sup>+</sup> Channel Increases MuRF1, but not Atrogin1, E3 Ligase Proteins in Skeletal Muscle*

Skeletal muscle atrophy is the loss of muscle size and strength which often occurs with injury, disease states and normal aging. We have shown that the ERG1a K<sup>+</sup> channel, known to be partially responsible for cardiac action potential repolarization, participates in the onset of skeletal muscle atrophy by up-regulating the proteolytic activity of the ubiquitin proteasome pathway (UPP). However, the nature of the increase in UPP activity is not known. We hypothesized that the MERG1a channel increases components of the UPP pathway, specifically the MuRF1 and Atrogin1 E3 ligases known to target contractile proteins for degradation by the UPP in muscle. Therefore, we injected the left gastrocnemius muscles of mice with an expression plasmid encoding MERG1a while injecting the right muscles with an empty control plasmid. An electrical shock was applied to the legs of anesthetized mice to drive the plasmid into the cells. Another set of mice were hindlimb suspended to produce muscle atrophy and validate that atrophy does cause increases in MuRF1 and Atrogin1 proteins. After seven days, gastrocnemius muscles were harvested from hindlimb suspended and MERG1a-injected mice and prepared for western blot. Immunoblots demonstrate that hindlimb suspension results in significant increases in both MuRF1 (434%,  $p < 0.001$ ) and Atrogin1 (222%,  $p < 0.05$ ) proteins whereas ectopic expression of MERG1a in skeletal muscle causes a significant increase (156%,  $p < 0.05$ ) in MuRF1 protein only. This data is in accordance with mRNA expression data produced by our lab. The mechanism by which the MERG1a K<sup>+</sup> channel causes the increased transcription and translation of the MuRF1 UPP E3 ligase is unknown. It is tempting to speculate that MERG1a modulates pathways already shown to increase MuRF1 synthesis, such as the I $\kappa$ B- $\alpha$ /NF- $\kappa$ B pathway. Investigation of the mechanism could lead to the development of more specific and effective therapies for muscle atrophy.

**Erin Brown**

Department of Foreign Languages and Literature

*The Reactions to the Life and Work of Delmira Agustini*

The art of poetry is a difficult art to master and enjoy. When a reader happens upon a poet that truly touches their heart, a poet that seems to understand the reader without knowing them, it is then that a connection has been made. The poet Delmira Agustini, native to Montevideo, Uruguay, has touched many readers in this way. Her poetry pushed the lines of conventionality and her work challenges readers today just as it did one hundred years ago. The roles of women in society—here in America and in Uruguay—have changed significantly since Agustini began writing, and it is interesting to see how these changes have affected the criticisms that have been written about her poetry. Even though Delmira passed away almost one hundred years ago, her poetry continues to live to this day, and students, readers, and critics continue to read her haunting lyrics, examining other opinions in order to try to truly discover what Delmira is attempting to convey. Her poetry, although not extremely well-known, is being made known by becoming translated into languages other than Spanish and by the addition of critiques so her work may be better understood. Her poetry encourages bravery in those that struggle with oppression, and through the research of her life, work, and the reactions to such, others may be able to follow in her daring footsteps as well.

**Sarah Buto**

Department of Cinema & Photography and Department of Theater

*An Inspector Answers: A multi-media production*

The entertainment business is always changing, more and more, everything is becoming intertwined. As theater progresses with using multi-media during performances, I really wanted to show a way that was different from everything else. In the past couple of years, our Department of Theater has been using projections and multi-media as an aspect to their productions but it was still new to everyone. So with *An Inspector Answers*, I thought it would be the perfect play to work on as a double major in Cinema and Theater to prove what skills I have learned the past four years. My goal with this production was to make the audience feel like they are watching a film and a stage play at the same time without having that ever really realizing that they are watching two different forms of entertainment. I also wanted this to be an opportunity, not just for myself but for a lot of other students that have not quite been able to have the opportunity for themselves in their field. I wanted to make this show unique and something that people could remember. Along the way, we continually were finding hurdles to overcome with time, the space we were given and still learning the process of putting on a production and what all is required from that. Our biggest hurdle was just making sure we had enough time and practice with the projections so that they could run without any flaws. With attendance levels for both performances being between 80-100 people, the show went off perfectly and got nothing but great reviews from the audience. Overall, the production was a big success proving that with enough time dedicated to multi-media anything can be possible.

**Blake Cain<sup>1</sup> and Andrew A. Sharp<sup>2</sup>**

<sup>1</sup>Department of Physiology, <sup>2</sup>Department of Anatomy, SIU School of Medicine

*The Effects of Ethanol on Early Embryonic Motility*

Research in the field of Fetal Alcohol Syndrome (FAS) and other alcohol related birth disorders has historically focused on the structural and cognitive processes that are altered by ethanol (EtOH), the alcohol found in alcoholic beverages. However, recent changes in diagnostic criteria have shifted to a continuum of Fetal Alcohol Spectrum Disorders (FASD). The question remains, how much alcohol a pregnant mother needs to consume before deleterious effects occur. Population research has shown that most cases of FAS only occur in alcoholic mothers. However, the current state of knowledge is that one alcoholic beverage a night is most likely not going to cause any developmental disorders, though no alcohol is usually promoted. During development, embryos will exhibit episodes of spontaneous movement which are vital to proper development. This phenomenon is best exemplified when a mother feels her fetus kicking. Studies have shown that EtOH has the potential to inhibit this movement. However, these studies have not been able to quantify how movement is altered. The current project is investigating what effects a minimal dosage of EtOH, comparable to that of a single alcoholic beverage, would have on a developing embryo, specifically the sensorimotor system. Utilizing the chick embryo model, the effects of EtOH on overall movement as well as sensory integration can be quantified. A single dose of EtOH was delivered on embryonic day (E)8. Embryos were exposed on E9 and allowed to move freely in a single plane while synchronous kinematic (quantification of movement) and force data were collected. Final analyses were made using a MatLab routine previously demonstrated to be feasible for a dual motility-force analysis. If EtOH is having an effect on the sensorimotor system, then the calculated kinematics and forces will be able to show changes quantitatively.

**Kaci D. Clark**

Department of Psychology

*Intrinsic and Extrinsic Religiosity Effects on Attitudes toward Contraceptives and their Usage*

This research study examined the effects that salience of intrinsic or extrinsic religiosity has on personal attitudes toward contraceptives and their usage. Participants were randomly assigned to 1 of 3 conditions, one which made intrinsic religiosity salient, one which made extrinsic religiosity salient, or a control condition. Along with the experimental conditions, participants completed measures which assessed their personal attitudes toward the categories of medical, drug-store, and natural contraception methods, their past use of, current use of, and intentions to use contraceptives. Participants completed a measure of quest religiosity, a measure of religious commitment, a measure of religious behavior, and measures of denominational and demographic questions. Results showed that patterns were beginning to emerge in the data regarding birth control pills and condoms, likely because these were the most common methods of birth control assessed. However, a larger, more religiously diverse sample would be needed in order to examine these effects further and to find significant results in general. This research demonstrates that it is difficult to separate intrinsic and extrinsic religiosity in a manipulation of salience, particularly in a small sample.

**Brittany Dickson**

Department of Psychology

*The Relations Between Identity Styles, Personality Traits and Conflict Resolution Styles in Emerging Adults*

The transition from late adolescence into emerging adulthood is a time of great change in terms of personal and interpersonal responsibilities. It is a time of self-exploration and becoming independent instead of solely relying on ones guardians for aid. This is often a time when young adults first face and learn to resolve significant conflicts. These conflicts may arise from numerous venues including financial responsibility, education, or employment status conflicts. This study will examine conflicts and how they are resolved by emerging adults. Conflict resolution styles for emerging adults may vary based on interpersonal relationships (e.g., with peers) and overall identity processing style. Therefore this study examined the relation between identity styles, personality traits and conflict resolution styles among emerging adults; specifically peer relationships as these types of relationships may the greatest influence on the development of emerging adults.

**Ashton Dixon**

Department of Biological Sciences

*The Potential Association between Acute Myeloid Leukemia and Cigarette Smoking*

*Introduction:* Acute myeloid leukemia (AML) is a type of cancer that is most commonly found in adults. Some of the risk factors for developing AML include benzene exposure, radiation or having previous chemotherapy treatments. Tobacco has also been considered to be a risk factor, however has not been studied intensely to determine if it truly is a factor in developing AML. This paper is a systematic review that discusses the potential association between AML and cigarettes.

*Methods:* Seven studies were chosen for this systematic review, and data was extracted from each study. Smoking status, age of patients and number of AML cases were extracted. Fourteen other articles were found as references, but were not used as studies in the systematic review.

*Results:* The results of this systematic review pointed to an association between cigarette smoking and an increased risk of AML. Six out of seven of the studies found that over 50% of patients diagnosed with AML were ever smokers.

*Conclusion:* This study contributes to other studies that provide evidence of a potential association between AML and cigarette smoking. It provides an accumulation of evidence that suggests a potential link between AML and cigarette smoking.

**Steven D. Ebers and Prema Narayan**

Department of Physiology

*The Effect of Testosterone on Leydig cell Proliferation in Male YHR<sup>+</sup> Mice*

Leydig cells (LC) are specialized cells in the testis that develop during puberty and are responsible for producing testosterone. Luteinizing Hormone (LH) and testosterone are important for LC development. Binding of LH to its receptor (LHR) initiates the production of testosterone. Constitutively active mutations in LHR have been identified in humans resulting in puberty in males as young as 3 or 4 years of age. A transgenic mouse (YHR<sup>+</sup>), was generated which mimics the constitutively active LHR by fusing the hormone, human chorionic gonadotropin to LHR to continually activate the receptor. Testosterone levels in YHR<sup>+</sup> mice are high at neonatal ages. Previous studies in the lab have shown that YHR<sup>+</sup> mice have decreased LC number compared to wild type (WT) mice. It was hypothesized that high levels of testosterone at neonatal ages was responsible for the decrease in LC numbers. To test this hypothesis, the action of testosterone was blocked with the androgen antagonist, flutamide, and the total number of LCs was determined. LC number was not significantly increased suggesting that other factors may be involved in the decrease in LC number. The goal of this study was to determine the effect of premature testosterone on LC proliferation. YHR<sup>+</sup> mice were injected from 7-13 days of age with either flutamide or vehicle control and with bromodeoxyuridine (BrdU) 2h prior to sacrifice at day 14. Testes were fixed, embedded and serial sectioned. Immunohistochemistry was performed with antibodies against BrdU to mark the proliferating cells and 3-beta hydroxysteroid dehydrogenase (3βHSD) to mark Leydig cells. The number of BrdU and 3βHSD positive cells was expressed as a percent of the total number of 3βHSD positive LCs. The results showed that testosterone did not decrease proliferation. Together, these results suggest that high neonatal testosterone is not sufficient to inhibit LC development.



## Benjamin Elliott and Samuel Martin

Department of Geology

### *A Foraminiferal Record of Holocene Climate Change on the Antarctic Peninsula Margin*

This project utilizes benthic foraminiferal microfossils collected from the eastern coast of the Antarctic Peninsula to reconstruct environmental and glacial conditions of the Holocene epoch ( $\approx 10,000$  yrs to present). Two sediment cores, JKC-62 and KC-63 located in Admiralty Sound, were collected approximately 6 km apart in 600 m and 535 m water depths, respectively. Two lithologic units can be recognized in both cores. Unit 1 is made up of sand to gravel size sediments and comprises 0-40 cm of JKC-62 and 0-120 cm of KC-63. Unit 2 is made up of silty-clay sized sediments and comprises 40-320 cm of JKC-62 and 120-246 cm of KC-63. Unit 1 typically contains large numbers of reworked Cretaceous aged foraminiferal specimens due to high rates of melting of Swift Glacier resulting in reworking of sediments from the southern region of James Ross Island. This is evident in Unit 1 of JKC-62, while in Unit 1 of KC-63, Cretaceous species and Holocene agglutinated species, such as *Nodulina kerguelensis* and *Miliammina oblongata*, occur. In Unit 2 of JKC-62, *Nonionella iridea* is the dominant species accounting for nearly 70% of all foraminifers found. Three major environmental changes occur at core depths 60, 110, and 210 cm in which *Nonionella iridea* diminishes and results in an increase in either *Globocassidulina subglobosa* or *Portatrochammina rossensis*. These rapid declinations indicate corrosive colder waters detrimental to calcareous species such as *Nonionella iridea* and linked to ice shelf and sea ice formation. Unit 2 of KC-63 displays calcareous species in the silt-rich portions, but agglutinated species dominate until 240 cm. Below 240 cm, an increase in calcareous species such as *Nonionella iridea* and an increase in overall species diversity occurs.

**Eric French**

Department of Psychology

*Effects of Traumatic Brain Injury on Behavioral Inhibition in Rats*

A common debilitating deficit following traumatic brain injury is the inability to inhibit inappropriate behavior. Developing an animal model of the effects on behavioral inhibition might further our understanding of the underlying mechanisms of these behavioral problems. In turn, use of this model might inform the development of pharmacological and/or behavioral therapies to help individuals overcome these deficits. One possible metric of inhibition is the ability of an animal to discriminate when a given behavior is appropriate for the circumstance from when it is inappropriate. In this ongoing study a “Go-No Go” task was used to assess deficits in inhibition produced by traumatic brain injury. Rats’ lever pressing was reinforced with milk in the presence of steady illumination of the operant chamber lights and was not reinforced in the presence of flashing (1.15 Hz) lights. The rats learned to inhibit lever pressing in the presence of the flashing light. Following behavioral acquisition, the rats experienced multiple generalization tests to assess the spread of inhibition by briefly presenting flash rates of varying similarity to the training stimulus and recording the propensity to respond. Rats were then paired based on similarities in behavior. One rat in each pairing received a medial lateral prefrontal injury, whereas the second rat received an intact sham surgery. Following post injury assessments, the sham rats then received the injury and were further assessed. Preliminary data suggest that the “go-no go” procedure may be a useful tool for assessing recovery of function following head trauma.

**Adolfo Frias and Derek J. Fisher**

Department of Microbiology

*Elucidating the Glycogen Anomaly in Chlamydia spp.*

*Chlamydia* spp. trachomatis are Gram-negative, obligate, intracellular bacterial pathogens that exhibit different tissue and host tropisms resulting in distinct infections. Perplexing, *Chlamydia* spp. have closely related genomes and the reasons for these tissue/host tropisms remains elusive. Prior to 16S rRNA speciation, glycogen-staining phenotype was used to classify glycogen-positive species as “*Chlamydia*” and glycogen-negative species under “*Chlamydophila*”. Surprisingly, genome sequencing of “*Chlamydia*” and “*Chlamydophila*” species revealed that both groups have the full arsenal of genes for glycogen metabolism (*mrsA* and *glgC*, *glgA*, *glgB*, *glgP*, and *glgX*) indicating that either these genes are non-functional in the “*Chlamydophila*” or that glycogen production is vastly different between these species explaining their presumed negativity. We hypothesize that minor phenotypic variations between species, such as glycogen production, may play a role in determining tropism and virulence. To begin addressing this hypothesis, my project focused on determining whether *Chlamydia pneumoniae* (formerly *Chlamydophila*) contains a functional set of glycogen genes. To test functionality, *glg* target genes were inserted into various plasmids (to assess complementation platforms) for expression in the respective *E. coli glg* deletion mutant. Complementation of the wild-type *E. coli* glycogen phenotype was then assessed on Kornberg agar plates using Lugol’s iodine staining. Our results show that the *C. pneumoniae* ADP-Glucose Pyrophosphorylase (GlgC) is able to complement the  $\Delta glgC$  *E. coli* mutant strain when expressed under a *lac* promoter in its native form and as a His-tagged recombinant construct. The production of His-GlgC was verified using SDS-PAGE with Coomassie Brilliant Blue Staining and Western Blotting. As GlgC is a key regulatory enzyme in the glycogen pathway, our data suggests that *C. pneumoniae* is able to produce glycogen. Future work will focus on assessing functionality of the remaining *glg* genes and purifying His-GlgC for *in vitro* enzyme assays to study pathway regulation.

## Sabrina Gerzel

Department of Education

### *Student Voice and the Balance of Power when Creating School Culture*

A popular discussion in the education field is the development of student leadership and the power struggle within the schools themselves. In my presentation I hope to explain the significance of a “student voice” and equal distribution of power to create a successful culture within a school. I will emphasize this point through articles published by credited researchers in the education field and findings from a study I performed last spring alongside Dr. Cameron Carlson in which we interviewed students from Egyptian High School in Tamms, Illinois. Through these sources I will show that students share responsibility in developing school culture as well as their faculty. I will also show that a balance of power between faculty and students is the most beneficial way to create a positive culture. School culture is considered by some to be a defining factor in the overall effectiveness of a school so the importance of creating a culture that benefits both students and faculty is crucial. The purpose of this project is to determine how to effectively develop “student voice” and equal distribution of power to create a successful school culture. Conclusions from this study might influence how school leaders instill leadership practices in their students and how they make decisions regarding the school.

**Lacey Gibson and Dr. Buck Hales**

Department of Physiology

*Ovarian Cancer and Diabetes: Can Metformin be used to Halt Tumor Growth and Proliferation?*

Ovarian cancer and type II diabetes are diseases that are of importance to the scientific community because of their severity and widespread effects on the American population. Both diseases share a variety of risk factors, and some drugs used to treat diabetes are associated with a decreased cancer risk in individuals. In particular, Metformin (1-carbamimidamido-N,N-dimethylmethanimidamide,  $C_4H_{11}N_5$ ), currently the number one worldwide anti-diabetes drug, shows promise in becoming a prescribed medication for cancer patients. Through activation of AMP-activated kinase in cancer cells, Metformin may inhibit cellular proliferation by causing cancer cells to decrease gluconeogenesis, starving the cells of their abundant glucose supply that previously allowed tumor growth.

This experiment was designed to study the effects of Metformin on cancer at a cellular level by measuring lactic acid production, a molecule that is present in excess when gluconeogenesis is inhibited by activation of AMP Kinase. In this experiment, cancerous (SKOV3) and noncancerous (IOSE) ovarian epithelial cells derived from humans were grown in culture in control media and media containing Metformin. Results showed that levels of lactic acid were significantly higher in Metformin-treated cancer cells compared to control cancer cells, indicating a decreased rate of gluconeogenesis, and therefore decreased glucose supply, which would point to the drug's ability to decrease development of cancer. Further testing of Metformin's ability to decrease cell proliferation is essential in increasing support of the ability of this drug to treat cancer patients, and thereby improving the quality of life of both diabetes and cancer victims.

**Lacey Gibson and Dr. Dhitinut Ratnapradipa**

Department of Health Education

*The Shattered French Paradox*

The French are set apart from all other cultures by their nonchalant demeanors, their haute couture, and their ability to take pleasure in life by indulging in local wines, cigarettes, cheese-laden quiche, buttery pastries, and rich chocolates. These indulgences have caused us to term the ability of the French to enjoy these unhealthy luxuries yet remain in excellent health the “French paradox”. Cancer was once relatively unheard of in France. The nature of the disease was previously a mystery, but advances in research are leading scientists to believe that genes that cause uncontrolled cell growth are present in an individual’s genes, which can often be switched on and off by conditions that the body is exposed to and by lifestyle factors. As the French adopt a US-lifestyle and continue to carry out their own distinctive lavish habits, cancer rates are on the rise in France, and the paradox is slowly becoming shattered. The unprecedented healthcare system causes the French cancer patients to have an excellent survival rate, but there is undoubtedly a great deal of work on the federal and individual level to be done toward cancer prevention, especially in promoting a healthy lifestyle.

This project compares the healthcare system of France to the systems implemented in the United States and Kenya, two countries at opposite ends of the spectrum of development. Furthermore, options to ameliorate the rising cancer rate in France are explored. Findings of this study suggest that France’s rising cancer rate is associated with lifestyle factors rather than funds spent on healthcare. Moreover, improving lifestyle habits, such as becoming active, improving diet, reducing alcohol consumption, and restricting tobacco use, can lead to lower rates of cancer development in France.

**Amber Gilliam, Farah I. B. Jayos, Ashley Wells, Nicolette Winn,  
Yara S. Artis, Dustin R. Nadler\*, & Meera Komarraju\***

Department of Psychology

*Shades of Grey: Ethnic Differences in Ethnocultural Empathy*

As society continues to evolve, a majority of the population may believe racism is no longer an issue. The current study, however, seeks to understand differences in European and African American students' ethnocultural empathy. Researchers Swim and Miller (1996) and Sifford, Ng, and Wang (2009) found that there are differential levels of ethnocultural empathy between and within dominant groups and non-dominant groups. Non-dominant (non-White) students have been shown to report higher levels of ethnocultural empathy than their dominant (White) counterparts. In the current study, 112 undergraduate students were surveyed using the Ethnocultural Empathy Scale (Ng, & Wang, 2009) to measure levels of ethnocultural empathy. Analyses of variance indicated significant differences between European American and African American students on the ethnocultural empathy scale, as well as some of the subscales of this measure. The results of this study implicate the need for exposing college students to different ethnic and racial groups and requiring multicultural education in higher education institutions. In doing so, students may learn to have more ethnocultural awareness, a quality that may pay large dividends in their success in the work place and for society.

**Mercedes Gomez Jacobo**

Department of Geography and Environmental Resources

*Deforestation and Globalization in Central America-El Salvador:  
History, environmental challenges and solutions*

The long narrow isthmus of land known as Central America was at one point, almost completely covered by forests. Today it is an intricate cultural and ecological matrix, home to over 50 million people and 7% of the world's biodiversity. El Salvador is the most densely populated country in Central America with 6 million citizens. During the late 1990's El Salvador became known for its extensive deforestation and land degradation, previous studies found that only 2-5% of its natural forests remained. Research suggests that deforestation and land manipulation in El Salvador began over 3,700 years ago in pre-Columbian times and was exacerbated after the arrival of the Spanish in the 16th century. This study analyzes some of the ecological impacts of agriculture on the region from a historical perspective based on 19th and 20th century practices, deforestation and its relationship to globalization in the modern world, as well as forest resurgence. El Salvador is unique in that years of civil war and globalization have assisted in the resurgence and recuperation of forests, although anthropogenic, these forests offer resources to people and have an impact on regional microclimates. Another critical element to the people of El Salvador is water and water resource management. We analyze the current threats to water supply such as arsenic (groundwater), mining pollution (rivers/streams) and natural disasters (floods). Solutions to these issues which are currently being explored include: agro-forestry, crop rotation and a country wide ban on the mining of precious metals.



**Zachary Guilford and Marjorie Brooks**

Department of Zoology

*Electron Transport System Activity as a Biomarker to Assess Energy Consumption in Daphnia magna in a Range of Multiple Stressors*

Aquatic ectotherm populations are at high risk due to global warming and polluted waters. The energy needed to deal with contaminants and higher temperatures alters the overall energy budget of the organism. The high energy cost of dealing with these stressors consumes energy and can lead to reduced growth, reproductive output, and death. In our study, the electron transport activity (ETS) during cellular respiration in the freshwater crustacean, *Daphnia magna* was used as a biomarker to assess the energy consumed by the organism under different temperature regimes. *Daphnia* were subjected to two temperatures of 24° C and 26°C and sublethal mixtures of cadmium, copper, and mercury for 48 and 96 hours in natural waters from Little Grassy Lake to test the hypothesis that ETS activity would increase linearly with increasing temperatures and metals exposure. The ETS activity was analyzed by the difference in oxygen consumption between 2-day and 4-day old daphnia to determine the oxygen consumed over two days. Lake water was analyzed using flame atomic absorption spectroscopy to directly measure metals concentrations. Unlike previous studies in the literature, initial results were inconclusive. Potential explanations for these unusual results are experimental error or differential susceptibility among strains of daphnia. Results of ongoing experiments will also be presented.

**Jason Gumbel, Deborah O. Jung, and Dr. Buffy S. Ellsworth**

Department of Physiology

*FOXD1 is Important for Normal Expression of Luteinizing Hormone*

The pituitary gland is necessary for normal reproductive function and is the central component of the hypothalamic-pituitary-gonadal (HPG) axis. The HPG axis consists of hypothalamic stimulation of pituitary gonadotropes by gonadotropin-releasing hormone, resulting in synthesis of luteinizing hormone (LH) and follicle-stimulating hormone (FSH). These gonadotropin hormones are essential for reproductive function. Several forkhead transcription factors play important roles in reproduction. We are investigating how loss of the forkhead transcription factor, *Foxd1*, affects pituitary development and function. *Foxd1* is expressed in the mesenchyme, or the area around the pituitary, which is an essential source of signaling factors that regulate pituitary development. Mice that lack the *Foxd1* gene die within 24 hours of birth due to kidney failure. Loss of *Foxd1* causes a morphological defect in which the anterior lobe of the pituitary gland protrudes through the developing cartilage plate ventral to the pituitary by embryonic day (e)14.5 and continues through e18.5. Immunohistochemistry (IHC) staining for BrdU, which is a marker for actively dividing cells, shows that there is an increased number of proliferating cells in the pituitary at e14.5 and e16.5. *Foxd1* null embryos also exhibit significantly decreased levels of *Lhb* expression at e18.5. Previous studies have shown that loss of the LIM homeodomain factor, *Lhx3*, results in loss of LH production. Although there is a difference in *Lhb* expression in *Foxd1* null mice, the number of LHX3 expressing cells is not different in ages e10.5, e11.5, e12.5, e14.5, e16.5, and e18.5. These studies suggest that *Foxd1* is indirectly required for normal *Lhb* expression and cartilage plate formation.

**Sydney Haberberger, Dr. David Gilbert, and Norka Rabinovich**

Department of Psychology

*Recognition of Facial Displays of Emotion in Marijuana Users Before and During a Cessation Period*

This project involved the development and piloting of an emotional face recognition task during which subjects will be asked to view two simultaneously presented images while eye movement is monitored as they gaze at one picture and then the other. A Viewpoint™ computerized eye-tracking system will be used to provide moment-to-moment changes in eye-gaze. The purpose of this task is to examine how well marijuana smokers are able to recognize emotions on the human face before and during a period of cessation from smoking marijuana. Sets of images were selected from the the Sackler Institute NimStim Face Stimulus Set. Cedrus SuperLab Pro™ will be used to present the images. The images used for the development of this task were modeled after Paul Ekman's set of images that he used in his studies of emotions in relation to facial expressions. The images consist of a range of 4 emotions: happy, sad, angry, and fearful, as well as a neutral expression from each of 43 different individuals. The development of this task began with determining which "action sets," or groups of facial muscles, control each expression of emotion. The computer program Morpheus™ was then used to place 130 points on each picture where the underlying muscles would control the display of facial expressions that corresponded to each emotion. Then, each picture displaying an emotion was morphed with the same individual's neutral picture. This allows one to move through different points in the morph, which shows the progression from a neutral face to an emotional one. The expectation for this emotional face recognition task is that marijuana users will be better able to identify the emotive faces after abstaining from marijuana than the pre-quit period and have a less negative bias toward slightly negative images.

**Renee Hazen**

Department of Zoology

*Sulfentrazone Toxicity Testing*

There has been a recent increase in concern over the potential risk of herbicides to the environment. One herbicide of concern is the phenyl triazolinone, sulfentrazone, due to the limited data available. This herbicide is commonly used on several agricultural crops including soybean, potato, sugarcane, sunflower, peanut, and tobacco crops. Previous studies suggest that sulfentrazone was persistent and may be easily transported from agricultural fields into aquatic systems, where it may pose a risk to non-target aquatic species. However, due to a lack of data, the magnitude of that risk was largely unknown. The objective of the current study was to evaluate the potential acute toxicity of sulfentrazone to two typical laboratory non-target species test species, duckweed (*Lemna minor*) and water fleas (*Daphnia magna*). To measure the effects on survival and growth of a plant species, standard toxicity testing was conducted using duckweed, which proved to be sensitive at environmentally relevant concentrations. Since previous studies have determined *D. magna* to be relatively insensitive to sulfentrazone, the survival of this species at the highest detected environmental concentration and five times this value was determined and no significant mortality was observed. This data offers some insight to the potential risk of this herbicide to both plant and animal non-target species and provide direction for future studies.

**Steven Jesselson and David Gibson**

Department of Plant Biology

*Studying the effects of Activated Carbon on Japanese chaff flower (Achyranthes japonica (Miq.) Nakai) and Japanese stiltgrass (Microstegium Vimineum (Trin.) A. Camus) seedlings*

Non-native invasive species are critical to study to implement efficient management methods. These species threaten the biodiversity of an area through various forms of competition. One aspect of competition observed in invasive plant species is allelopathy. Allelopathy occurs when plants release harmful biochemicals (allelochemicals) into the soil affecting nearby native plant species. Activated carbon is used to study the allelopathic effect of such plants due to its ability to absorb these allelochemicals. This study was conducted under greenhouse conditions to measure and quantify the effects of activated carbon as an experimental treatment on two invasive plant species found in the southern Illinois region, Japanese chaff flower and Japanese stiltgrass. Two treatments were applied at the beginning of the growing period, including all combinations of the presence or absence of supplemental fertilizer, and the presence or absence of activated carbon. Measurements of the plants were taken weekly over six weeks of plant height, node and leaf production, tiller development and final above and belowground biomass. The results indicate that performance of neither Japanese chaff flower nor Japanese stiltgrass seedlings were affected by the presence or absence of activated carbon, but both grew larger in the presence of additional fertilizer regardless of activated carbon treatment. These results confirm that activated carbon can be used to establish a no-allelochemical treatment that will not affect plant growth in more extensive allelopathy studies investigating competition between these two co-occurring invasive plant species. This study of Japanese chaff flower and Japanese stiltgrass may assist in further knowledge of these invasive plants and provide insight into future management practices.

**Cody M. Jordan<sup>1</sup>, Joanne C. Crawford<sup>2</sup>, Leah Berkman<sup>3</sup>, and Clayton K. Nielsen<sup>2</sup>**

<sup>1</sup>Cooperative Wildlife Research Laboratory and Department of Forestry

<sup>2</sup>Cooperative Wildlife Research Laboratory, Department of Forestry and Center for Ecology

<sup>3</sup>Cooperative Wildlife Research Laboratory and Department of Zoology

*You Are What You Eat: Using Stable Isotopes to Determine Differences in Diet between Rabbit Species of Southern Illinois*

Interspecific competition may be reduced through niche partitioning, or changes in resource utilization, such that both species avoid competition for the same limited resource. In southern Illinois, ongoing research suggests that both eastern cottontail (*Sylvilagus floridanus*) and swamp rabbits (*Sylvilagus aquaticus*) use early-successional bottomland forests, but little is known regarding resource partitioning where they co-occur. To that end, we examined dietary overlap between cottontails and swamp rabbits at 3 bottomland sites along the Cache River in southern Illinois. We used hair samples from 15 cottontails and 10 swamp rabbits live-trapped during the winter of 2009-2010 to evaluate differences in stable isotope ratios of carbon and nitrogen (and thus to infer differential resource use). We modeled the effects of species and site on isotope ratios using linear mixed-effects models and found differences between species in isotopic ratios of both N ( $p = 0.0014$ ) and C ( $p = 0.0014$ ), however, an interaction between site and species for N ( $p = 0.0069$ ) was evident. This study demonstrated that cottontails fed on higher proportions of warm season (C4) plants, whereas swamp rabbits within our sample fed almost exclusively on cool-season (C3) plants. This suggests that eastern cottontails were much more generalist in their feeding habits. Our results indicate that these sympatric species may be partitioning resources where they co-occur, but further research is necessary to determine if competition does indeed drive resource use.

**Samuel Jordan**

Department of Psychology

*Tracking Food and Conditional Reinforcers in a Rapidly Changing Environment in Rat*

The purpose of this study was to examine choice with rats responding in a rapidly changing environment for token reinforcement that was later exchanged for food. Rats allocated presses between two levers during seven components that varied the relative probabilities of reinforcement for responding on the left versus the right lever. Tokens were probabilistically assigned to the left or right lever after an average of 15 s has passed (RI 15 s reinforcement schedule) such that the ratios of left : right lever assignment was 1:1, 1:3, 1:9, 1:27, 3:1, 9:1, or 27:1. In Phase 1 of the experiment, rats could exchange a token for food immediately after it had been earned. During Phase 2, lever presses occasionally (RI 120 s) produced food reinforcement in addition to tokens, however, the ratio of left : right food reinforcement was held constant at 1:1. Also, in phase 2, 10 tokens had to be earned prior to an opportunity to exchange tokens for food. The rats developed preferences for the lever that produced a higher probability of tokens in phase 1, but not phase 2, suggesting that allowing food reinforcement to follow lever presses disrupted the sensitivity to the relative rates of token reinforcement. Furthermore, in phase 2, the rats showed sensitivity to the exchange period by responding at higher rates as more tokens were earned.

**Brock Kabat, Mason Tippy, Deborah O. Jung, and Buffy S. Ellsworth**

Department of Physiology

*The Forkhead Transcription Factor, Foxo1, is Required for Normal Somatotrope Function During Mouse Pituitary Development*

Congenital hypopituitarism occurs in approximately one out of every 4,000 live births. Half of these cases have unknown etiology. The long-term goal of our studies is to expand the molecular diagnoses for congenital hypopituitarism by identifying genes that contribute to this condition. The forkhead transcription factor FOXO1 is present in approximately half of somatotrope cells at embryonic day (e)18.5 and in adult mice. This study sought to elucidate the role of FOXO1 in mouse pituitary function by conditionally deleting *Foxo1* from the pituitary using a *Foxg1-Cre*.

Immunohistochemistry (IHC) stains were used to compare hormone localization in wildtype and conditional knockout mouse pituitaries at e18.5. *Foxo1* conditional knockout mice exhibit significantly less growth hormone immunoreactivity than wildtype mice. These data suggest that *Foxo1* is required for normal somatotrope function. We are currently investigating whether other pituitary hormones are affected by loss of *Foxo1* at e18.5 and in adult mice. These studies identify *Foxo1* as a candidate gene for congenital hypopituitarism.



**Bryan Quah Kah Ming and Samuel Ma**

Department of Civil and Environmental Engineering

*Impacts of different chemical state of silver on its phytotoxicity to plants and its distribution in plant tissues*

Engineered nanoparticles are defined as manufactured materials with the size of 1- 100 nm in at least two dimensions. Previous research showed that these nanoparticles often possess unique electronic, magnetic and optical properties compared with their bulk materials and have found many novel applications in today's society. However, previous research also showed that these nanoparticles display drastically different environmental behaviors and impacts than their bulk counterparts. Some have even shown significant toxicity to plants, animals, microorganisms, and human cell lines. However, there have been disagreements regarding the nature of toxicity of silver nanoparticles. It is still unsettled that whether the silver nanoparticle toxicity is due to the release of silver ions or silver nanoparticle itself that exert toxicity to different organisms. This study aims to investigate the impacts of different chemical state of silver (ionic, nanoparticles, and bulk) on its phytotoxicity to plants and its distribution in plant tissues in order to shed light on the current debate about the nature of silver nanoparticle toxicity. *Glycine max* (soybean) and *Triticum aestivum* (wheat) were chosen based on their relevance to our food safety and security. The experiments were carried out in hydroponic conditions in bench scale and multiple toxicity indicators of plants such as their weight and root health were monitored for all experiments. The results suggested that silver at different state exerted differential toxicity to these two plant species.

**Anna Kallal and Kathryn Martin**

Undergraduate in Communication Disorders and Sciences, Senior Lecturer/Clinical Supervisor

*Perceptions of required intra/interpersonal skills for choice of profession for Communication Disorders and Sciences and Engineering Majors*

The purpose of this research project was to determine if Communication Disorders and Sciences (CDS) and Engineering student's perceptions of their own personalities had an impact on their career choice. A survey was designed with the intent of determining what the students perceived their personality traits to be; compatible personality traits were derived from research for each major and then chosen to be included in the survey. The survey identifies the top ten personality characteristics determined by students in their respective disciplines and notes a distinct contrast in the two fields. Agreement is noted as to where subjects gained their perceptions: other people and self-observation. The survey was also to determine whether students had considered personality traits that typically match their choice in major. The students who participated in the survey were asked to consider whether or not they thought about their personality matching their choice of major. In another section, each question was designed to obtain information about various personality traits chosen for the survey. This project gave me insight into possible considerations people have when choosing their careers. I also learned the differences not only in personality traits between CDS and Engineering majors, but the difference in the ways they consider their personality before choosing their major.

**Deanna Keller**

Department of Pre-Veterinary Medicine and Science

*Relationship Between Diameter and Blood Perfusion of Pre-ovulatory Follicle and Corpus Luteum on Progesterone Concentrations and Fertility in Cows*

Due to intensive cattle management systems and deficient breeding synchronization protocols, the beef and dairy industries have been severely impacted by infertility and economic losses during the last 10 years. During the last few years several studies have hypothesized the relationship between follicle vascularization, CL activity and fertility in farm animals. Recent studies using color-Doppler ultrasonography demonstrated that the percentage of blood flow and diameter of the pre-ovulatory follicle were greater in cows and mares that became pregnant when compared with those non-pregnant. With this project we hope to be able to study precisely the impact of pre-ovulatory follicle and corpus luteum quality on pregnancy rate after artificial insemination using a synchronized estrous cycle. There are three main purposes for this project. The first is to evaluate the relationship between pre-ovulatory follicle and the corpus luteum diameters. The second is to study the influence of pre-ovulatory follicle wall blood perfusion on corpus luteum vascularization, using color-Doppler ultrasonography. The third and final purpose is to evaluate the relationship among corpus luteum blood flow on systemic progesterone concentrations and fertility (e.g. pregnancy and early pregnancy loss). This project will generate background data to begin answering more in depth questions in future research projects in the field of fertility and reproduction in cows.

**Kayla Klugow**

Department of English

*Greek Myths Modernized*

The endeavor of this project looks at Greek myths such as those described within the Homeric Hymns and in other Greek works. This endeavor will take the morals and scenes from these great works and adapt them into free verse poems. The purpose of this adaptation is to show how relevant these poems are still, today and to spike interest and understanding of the original Greek myths.

**Austen N. Knapp<sup>1</sup>, Jessica M. Stout<sup>1</sup>, Elizabeth D. Grisley<sup>1</sup>,  
Doug G. Wallace<sup>2</sup>, and Joseph L. Cheatwood<sup>1</sup>**

<sup>1</sup>Department of Anatomy, Southern Illinois University School of Medicine, Carbondale, IL

<sup>2</sup>Department of Psychology, Northern Illinois University, Dekalb, IL

*Effects of subcutaneous daidzein on recovery of function in the rat after ischemic stroke*

Occlusive stroke is a leading cause of lasting disability in humans and often results in deficits in sensory and motor functions. There is still a need for a treatment that will enhance recovery and/or reduce behavioral deficits following stroke. In a previous study, our laboratory demonstrated a decrease in post-stroke behavioral deficits when provided a soy protein-based diet prior to stroke. Daidzein, a bioactive isoflavone found in soy foods, is a potential contributor to the observed effects. In the current study, we aimed to examine the effectiveness of daidzein as a post-stroke treatment by assessing forelimb function to determine post-stroke behavioral effects and gauge functional recovery. Young adult male Long Evans Hooded rats underwent a middle cerebral artery occlusion (MCAO), which induced a stroke lesion. Following MCAO, rats were treated with vehicle or daidzein by a subcutaneous osmotic minipump. The skilled ladder rung walking task was used to measure forelimb function recovery following stroke. The number of total, slight, and deep slips were compared between groups. No significant differences were found in total slips (slight plus deep) or slight slips between groups ( $p>0.05$ ). However, the daidzein group had significantly less deep slips than the vehicle group ( $p<0.05$ ). These results suggest subcutaneous daidzein administration mediates neuroprotection and provides enhanced behavioral recovery post-stroke.

**Andrew W. Lambert<sup>1</sup>, and Gretchen R. Dabbs<sup>1</sup>.**

<sup>1</sup>Department of Anthropology

*Chronological Age Estimation of Native American Remains in an Archaeological Context: Re-examining the Sternal Rib End*

The rib phase analysis aging technique developed by İşcan et al. is a common tool for estimating age from adult skeletal remains in forensic anthropology. However, its effectiveness for estimating the age of ancient adult populations of the New World still needs quantification, a necessity previously called for by senior scholars. This investigation sought to demonstrate the effectiveness of this aging technique in the archaeological context, hypothesizing that it would be effective. This study sampled 39 males and 17 females from the Archaic and early Woodland periods at the Black Earth Site in Southern Illinois, housed at Southern Illinois University. Age estimates from the İşcan et al. rib morphology phase method and pelvic age estimation methods (i.e. analysis of the pubic symphysis and the auricular surface) were recorded and tested for concordance. Because each method provides phase-specific mean age estimates, it was necessary to assign these estimates into the following three age groups: early adulthood, middle adulthood, and late adulthood (i.e. 17-34, 35-54, and 55+ years, respectively). Data analysis with Fisher's exact test shows a significant difference between the rib phase and auricular surface techniques in males ( $p = .0095$ ) and females ( $p = .0445$ ), but no significant differences between rib phase analysis and pubic symphysis techniques: males ( $p = .5836$ ) and females ( $p = .9999$ ). The analysis demonstrated mixed results. The rib end-based age estimates are not concordant with the auricular surface method of estimation, but are concordant with the sex-specific pubic method, which is potentially explained by the biological timing of the feature changes.

**Joshua Lambert and Dr. Benjamin Rodriguez**

Department of Psychology

*Individual Effects of Psychological Distress with Somatization*

Somatization is an all too common problem that creates devastating conundrums for the lives of the individuals afflicted and the healthcare costs of the world. A substantial body of evidence has been collected demonstrating that post-traumatic stress disorder, anxiety, stress, worry and depression are potential causes of somatization, both individually and when comorbid with one another. In this study, a participant pool of psychology undergraduates will be administered surveys to examine whether or not they display symptoms of any and all conditions listed above. Additionally, a statistical analysis of the data will be conducted via multiple regression with the goal of assessing which condition or combination of conditions potentiates the greatest risk of developing a somatoform disorder. It is hypothesized that an anxiety disorder will be the single greatest correlate to somatization, and that the comorbidity of anxiety and depression will ultimately yield the greatest correlation to the presentation of somatic distress. Pilot-testing data will be used to either corroborate or refute this hypothesis and will be useful in determining the future results of this study. It is the hope that these findings will lead to better treatments for somatizers and thus to attenuate healthcare expenses related to the presentation of somatic distress.

## Michelle Lanteigne

Department of Zoology

### *Dual toxicity of imidacloprid and cyfluthrin to two non-target organisms*

With the increasing use of toxic substances in today's society, insecticides like pyrethroids and neonicotinoids are being detected more notably in the environment. If the insecticide is applied improperly, or there is a rain event following application, runoff water can be acutely toxic to aquatic organisms; therefore, it is important to acknowledge the concentrations at which the insecticides become lethal or cause negative effects to non-target aquatic organisms. Toxicity experiments were conducted on two aquatic species to test the environmental safety of two chosen insecticides, imidacloprid and cyfluthrin, which are the active ingredients in readily available consumer products. *Hyaella azteca* is an aquatic organism found in urban streams that receive runoff from residential areas, and due to their known sensitivity to insecticides, they are commonly used in toxicity tests. The other species tested was *Pimephales promelas*, which is a fish species commonly used in laboratory toxicity tests and is considered a model organism as a surrogate for testing wild fish populations. Each species was exposed to the insecticides individually to gain an understanding of the different compounds' toxicity to the organisms. Following the individual tests, a mixture of the two insecticides was tested on the organisms to determine if there are any unexpected changes in toxicity when compared to the individual tests. Results from this experiment revealed the mixture of the two insecticides showed a synergistic effect on the organisms indicating a higher toxicity than predicted from the individual tests. Due to this increase in toxicity from the mixture, it further emphasizes the importance of testing mixtures especially since cyfluthrin and imidacloprid are found together in household products and therefore can potentially effect aquatic non-target organisms.



**Phi Le and Dr. Karla Horton**

School of Social Work

*Relational Aggression in College Students: The Effects of Mass Media and Empathy*

Relational aggression within college students creates a domino-like effect. The chain reaction starts amongst peers and ends with a hard crash in the hands of college and university faculty and staff. The purpose of this project is to examine the influences of mass media and empathy in college students when looking at relational aggression. Instruments used in the study are adapted versions of: Goldberg's (2009) Relational Aggression, Mass Media and Female College Students Survey, Davis' (1980) Interpersonal Reactivity Index (IRI) and Horton's (2010) Diverse Adolescent Relational Aggression Survey. One hundred college students were surveyed at a Midwestern university. Multiple linear regression analyses were used to analyze data. It was found that mass media and empathy were not statistically significant factors in predicting relational aggression amongst college students.

**Duane J. Lickteig and Vjollca Konjufca**

Department of Microbiology

*Uptake of Particulate Luminal Antigens by Epithelial Cells of the Colon*

Nanoparticles (NPs) are receiving growing interest by researchers due to their potential to be used as vaccine and drug vectors. Research conducted in our laboratory has shown that NPs up to 50 nm in size can be taken up by epithelial cells (ECs) of the small intestine (SI) and are transported to the lymph nodes to produce immune responses. During this project I sought to further characterize the uptake and transport of NPs, specifically within the large intestine (colon). The SI and colon greatly vary in their physiology. The colon lacks the lymphoid aggregates found in the SI, which have the ability to take up particulate bacterial and viral antigens. However, the colon plays a critical role in the absorption of water as chyme is further concentrated into fecal pellets. Here I sought to find whether ECs of the colon take up NPs in a size dependant manner, as in the SI. I administered NPs (sized 20, 40, 100, 200, 1000 nm) into the colon of anesthetized C57 BL/6 mice via a round tipped needle. One hour after NP administration mice were euthanized and their tissues snap-frozen. Tissues sections (5- 7  $\mu$ m thick) were stained with fluorescent antibodies for immunofluorescent (IMF) analysis and found that colon ECs take up preferentially smaller sized NPs (less than 100nm). NPs were also observed within the lymphatic system of the colon, signifying possible transport to lymph nodes. These observations could further our understanding of oral tolerance to food antigens; pathogenesis of enteric viruses (i.e. Norovirus); and the possibility of NP-based mucosal vaccines. In the future I plan to administer NPs conjugated to a protein antigen to the colon and measure the humoral immune response, which will be determined in serum samples by ELISA assays.

**DanYale Locke**

Department of Business Marketing

*The Study of the Impact of Customer Perceptions of Unethical Advertisements on Corporate Social Responsibility and Customer Loyalty*

The purpose of this study was to investigate whether or not perceptions of unethical advertisements have an effect on customer's perceptions of the sponsoring company's corporate social responsibility. Additionally, I examined whether a customer's perceptions of a company's corporate social responsibility has any effect on that customer's loyalty to the company, and whether this impact varies based in the respondents' gender. Data for this study was collected using a survey of college students at a mid-sized public university located in the Midwest. The results show that perceptions of unethical advertisements do not impact customer perceptions of the sponsoring company's corporate social responsibility. Further, the results show that the perception of corporate social responsibility has a positive impact on the customer's loyalty to the firm, and this impact was slightly moderated by gender. Specifically, females were slightly more inclined to become disloyal customers if they have negative perceptions of a firm concerning their corporate social responsibility. Some managerial implications are also provided.

## David Lynch

Department of Political Science

### *Campaign Finance Policy: The 2012 Election and Beyond*

The United States Supreme Court, as a result of its 2009 decision on the case *Citizens United v. Federal Election Commission*, opened the door for essentially uncontrolled spending on elections by outside Political Action Committees (PACs) and paved the way for the creation of Super Political Action Committees (Super PACs). First in effect in 2010, Super PACs can legally spend an unlimited amount of money on an election as long as they remain unaffiliated with any specific campaign. In 2012, due in large part to the continued development of Super PACs, a record amount of money was spent on political elections at a variety of levels. The sources of much of the money remain, in many cases, publically unknown. This project seeks to determine the effects that PACs had on the 2012 election and to examine the potential for reforming campaign finance policy. Data relating to the collecting and spending of funds, both by campaigns and by PACs, was aggregated. The amount spent on certain races was compared to the end results of those races. The spending on behalf of both major parties, by candidates and parties as well as by outside sources, was broken down. Additionally, the spending on the different levels of races was examined based on race, source, and party. Finally, the ruling on *Citizens United v. Federal Election Commission* was looked at to find potential avenues for reform.

**Yue-Huan Lyu, Che-Hsiung Lee, and Kyle N. Plunkett\***

Department of Chemistry and Biochemistry

*Orthogonal Functionalization of Dicyclopenta[de,mn]tetracene*

Fullerenes such as C<sub>60</sub> are the most commonly used electron accepting (n-type) materials for organic photovoltaics. However, there exists a critical need tune the electronic properties of a given electron acceptor to better match the frontier orbitals of donor materials. Unfortunately, chemical modifications of fullerenes do not lead to dramatically new electronic properties due to the lack of resonance effects between the core fullerene and its substituents. Recent work has shown that small molecule cyclopenta-fused polycyclic aromatic hydrocarbons (CP-PAHs), which are typically small fragments of fullerenes, possess many of the fullerene properties including high electron affinities and interesting photophysical properties. The benefit of utilizing small CP-PAHs instead of fullerenes as electron acceptors is the possibility for chemical modifications that would lead to conjugated materials with tunable electronic structures.

This presentation will detail my work on creating conjugated dicyclopenta[de,mn]tetracenes (four linear fused benzene rings). This work is an extension of previous work in the Plunkett group in which cyclopenta[hi]aceanthrylene (three linear fused benzene rings) has been synthesized. The newly conjugated CP-PAH species display interesting photophysical and electronic properties depending on the substitution location on the PAH core. This research experience has introduced me to air-free synthetic methods, purification strategies, and characterization techniques that are common in an organic chemistry laboratory setting.

## Lonnie Mann III

School of Art & Design, Industrial Design

### *Exploded View: I*

I have personal experiences with the M1911 pistol, which arguably falls outside of its original design intentions. My sculpture was created first within a three-dimensional computer aided drafting program, and was then three-dimensionally printed. This process allowed me to create a sculpture that is true to the original design constraints, yet transcends the limitations of traditional materials and processes associated with firearms manufacturing, as well as art making. Printing the sculpture in resin allowed me to merge the separate pieces of the firearm parts, in ways that are nearly impossible to recreate in traditional art mediums. The semi-transparency of the resin used within the creation of this sculpture allows the viewer to visualize the interaction of the rearranged parts as they merge into one another. The translucency of the resin allows me to visually represent a fantasy I experienced during the traumatic event that inspired this sculpture, including the cloudiness of my memory.

My process allowed me to manipulate the individual parts of the M1911, in a manner that created a novel sculptural form that transcends the original design constraints and limitations. I created a composition that capitalizes on the visceral design features of the M1911 firearm, while simultaneously rendering the firearm parts mechanically unusable. By doing so, I moved a significant object of Americana from within the design realm into the realm of art. The ultimate goal in creating this piece is to physically manifest how cognitive dissonance -- within a person's mind -- can help to illuminate avenues darkened by incorrect assumptions found within false dichotomies. The artwork I make often touches on technology and human behavior. I hope this piece encourages one to question their values and appreciate the power of artistic expression.

**Benard McKinley Jr**

Department of Radio-Television

*The Prevalence of the Sapphire Stereotype in Today's Reality Television: Effects on African-American Women and African –American Female Adolescence*

In the year 2012, stereotypes are still being used to misrepresent and demean women of color and with the reality television outlet; the stereotypes are being shown to a larger audience. Stereotypes are fixed or over simplified images or ideas of a particular type of person or thing. Reality television often exploits racial and ethnic groups by using stereotypes and sensationalized storylines to create viewer interest. This research investigated the existence of the Sapphire stereotype in two popular reality television series: *Basketball Wives & Love & Hip Hop*. The portrayal of African American women as angry and emasculating impacts how society views them as well as how young adolescent females may view themselves. This project examined these images, discusses their impact on younger African American females, and offers a broader critique on the genre of reality television. The information found in this research implicates that reality television will remain to be an ever growing medium until viewers question what they are being shown instead of dismissing the images as strictly entertainment.

**Victoria Mendez**

Department of Psychology

*The Effect of Time-Out from Reinforcement on Resurgence*

The purpose of this ongoing study is to exam the effects of previous learning on problem solving. Previous research has shown that when recently effective behavior no longer produces valued consequences of action that people tend to return to patterns of behavior that were once effective in more remote time periods. This return to previously learned patterns is called resurgence. In the current research, I assessed if a procedure intended to discourage responding (i.e., response contingent time out from reinforcement) will similarly produce resurgence. Participants used a mouse to click on four virtual “buttons” on a computer screen. They had to learn which sequence of four presses was correct. Completion of correct sequences probabilistically ( $p = 0.5$ ) produced a point on a counter, accompanied by a chime sound and smiley face graphic. In some conditions, the effective response pattern probabilistically produced time out periods, in addition to probabilistically producing points. During the time out, a frowning icon was presented on the screen and the participant was not be able to earn points. The purpose of this condition was to assess if response contingent time out production would produce resurgence of response patterns that were effective in previous conditions. Preliminary data suggest that time out from reinforcement may induce resurgence of previously learned response patterns. Data from additional participants will be required, however, before definitive conclusions can be drawn.



**Jenny Mick**

Department of Psychology

*The Effects of Parental Expectations on the Educational Aspirations of Youth*

Previous research has examined the educational aspirations of adolescents, with attention to the influence of variables such as socioeconomic status, gender, race, family structure, and parental expectations. In particular, some research has suggested that children who are raised in single-parent households are at risk for lowered educational aspirations; further, that parental expectations may serve as one of the major factors in determine educational aspirations (Davis & Pearce, 2007). The present study investigated how parental expectations may help overcome the at-risk nature of youth raised in single-parent homes, by examining different ways of communicating educational expectations. Participants consisted of 63 High School students ranging from grades 9<sup>th</sup> to 12<sup>th</sup>. This sample was somewhat limited in regards to race/ethnicity and only consisted of only 5 single parent households. Participants were given surveys that measured perceived parental expectations in regards to higher education, perceived parental involvement and knowledge of higher education, a checklist of perceived parental behaviors toward higher education, and a survey measuring the student's own educational aspirations. Results indicated positive relations between perceived parental expectations and student's aspirations.

**Caitlin Moliske<sup>1</sup> and Brittney Meador<sup>2</sup>**

Department of Physiology, College of Science<sup>1</sup>

Biological Sciences Education, College of Education and Human Services<sup>2</sup>

*The Investigation of Adaptation: A Creative Perception of Collegiate Behavioral Responses*

As a collaborative team, we created a short graphic novel in the Italian style “fumetti.” This style of comic design uses actual photography instead of hand drawn or computer generated images. Despite that we are both students in the sciences, we decided to collaborate on a creative project. Our intent was to develop something unique that could showcase our abilities and interests outside of the traditional route of research, while still presenting a work with sustenance and meaning.

This creative work focused on our experiences as college students and lessons we learned. Our project utilized techniques from published authors, while incorporating unique stylistic aspects of our own. We discussed various issues that are common among college students. Perhaps more importantly, we also brought light to situations that are not typical to the average student.

To create this work, we outlined a rough draft into four sections, each corresponding to each year in college. Each division contained a few stories. All photographs were edited using Photoshop and a variety of online photo editing sites. InDesign was used to create the layout of each page and all text was inserted by hand to give it a more personal edge.

Our thesis was not to simply recount all of our experiences, but look deeply into them; illustrating social stigmas, underlying influences and their effect on our choices. We felt that we offered another dimension to our piece that is important to society and relevant to future generations of college students.

**Travis Neal<sup>h</sup>, and Dr. David Gibson**

Department of Plant Biology

*Dispersal and seed vector transport of *Achyranthes japonica* (Miq.) Nakai*

A two year experiment was conducted to assess dispersal of a new invasive species, in order to gain insight on the transport of its seeds. The non-native invasive plant, *Achyranthes japonica* (Japanese Chaff flower), has morphological adaptations that appear to aid in seed dispersal and allow it to spread over large distances. When seeds are mature and ready to disperse, it is likely that they can become attached to the fur and feathers of game, such as white tailed deer and turkey, or the clothing of people, thus actively dispersing the seed. To investigate the efficacy of these seed dispersal vectors, a field study of Japanese Chaff flower was undertaken at Chestnut Hills Nature Preserve, southern Illinois. Performance of Japanese Chaff flower as well as dispersal data were recorded in 50 randomly located one  $m^2$  plots. Plant height and cover, seed rain, seed production, slope, overhead canopy cover, and species richness within each plot was recorded from 2011-13. Soil samples were collected from the plots in the fall of 2012 and analyzed for pH, conductivity, total nitrogen, and total carbon. Deer fur, turkey feathers, and cotton fabric were systematically moved across the plants in each plot collecting seed. The materials were combed to collect and then count the seeds that became attached. Seed rain estimates were determined from counts in seed traps constructed from pie pans coated with Tanglefoot that collect seeds that fall from mature adult plants. Overall, the field experiment showed that seeds are readily dispersed by deer, birds, and humans. The fewest number of seeds were collected by turkey feathers, while twice as many seeds were collected on deer fur and cotton fabric. These vectors collect large numbers of seed through brushing against the Japanese Chaff flower plants. Further, the dispersal of invasive species by human vectors is enhanced during particular life stages of this species. This 'hitch-hiking' mode of secondary dispersal is enabling Japanese Chaff flower to readily invade plant communities of southern Illinois as well as the surrounding Ohio and Mississippi River Valleys.

**Daniel Olsen**

Department of Electrical and Computer Engineering

*Critical Path Analysis of Multicore Systems using BDDs*

As more and more computing is done on multicore processors the software these processors are running have become more parallel. A problem that arises from the parallel software is that the algorithms they execute are hard to analyze and optimize and the resulting execution paths are immense. A proposed optimization method for these algorithms is to diagnosis critical paths. A critical path is the longest necessary path through the algorithm. Current solutions to the problem do not adequately diagnosis critical paths because they only trace the execution paths at the function level and cycle accurate multicore simulators are very slow.

The goal is to develop a multicore simulation software tool that is capable of simulating multicore message passing, performing software traces at the instruction level in order to diagnose critical paths, and verifying and optimizing parallel algorithms. The software tool is implemented as a high level library with which algorithms can be quickly developed; this allows the hardware to be abstracted to simple software interfaces. The multicore simulator uses Open Message Passing Interface (Open MPI) to simulate individual cores. This allows the simulator to quickly simulate many cores using limited computation power. Because the software traces can be in terms of billions of instructions they require good compression to allow storing. Binary decision diagrams (BDDs) which are highly compressed, canonical representations of binary functions are used to compress the software traces to allow them to be stored. A post-processing tool then analyzes the stored traces to determine synchronization points, race conditions, and critical paths.

**Arzanah B. Opon and Kenneth O. Simpson**

Department of the Rehabilitation Institute

*Sequential Analysis of Communication Interactions of Persons with Aphasia*

The field of speech-language pathology (SLP) is limited in the tools available for understanding interaction behavior. Many of the tools available are simple rating scales based on general perceptions drawn from observations. The current research proposes a methodology that measures interaction. The method of sequential analysis is used to identify proportional involvement in a dyadic pattern of interaction between individuals with aphasia and their communication partner. Sequential analysis allows SLPs to describe the mutual communication of hypothetical pairs when one is an adult with aphasia and the other has no communication impairment. Data was provided by a third party SLP who works in a health care field and frequently provides services to persons with aphasia. Two data sheets were completed based on hypothetical patients and their non-impaired communication partners. This method can identify the effects (a) of Speaker A on Speaker B, as well as (b) the effects of Speaker B on Speaker A. This research demonstrates the utility of sequential analysis.

**Justin Ostrowski, Jared M. Porter, and Julie A. Partridge**

Department of Kinesiology

*The effects of shame on motor skill learning*

Making learners aware of their mistakes is a frequent strategy used by practitioners; the common assumption is that doing this will ultimately lead to improvements in motor behavior. However, making someone aware of their errors, especially in front of their peers, can cause the person to feel ashamed. Nathanson (1992) defines shame as a highly self-conscious and negative emotion that is triggered by perceived devaluation. It is plausible that this change in emotional state has an influence on motor skill performance and learning; however, to date this possible influence has not been adequately investigated. The purpose of this study was to investigate if shaming an individual while practicing a novel task influenced motor learning. Participants ( $N=54$ ) were undergraduate college male students. Participants were randomly assigned to a Control or Shame condition. In the Shame condition participants were provided false negative information regarding their motor performance. Specifically, they were told their performances were below average for males in their age group. Additionally, a customized computer program was created that generated false feedback that was provided to the shame participant. Shame participants were in the presence of a peer while this false feedback was provided. Participants in the control condition practiced the same task, but were told their motor performances were consistent with “normative” college students. All participants completed a total of 36 trials of an anticipation timing task. Participants received summary feedback about their performances after every block of six trials. Participants returned the following day for post-testing. Post-testing data were converted to measures of AE, CE, ACE, & VE. One-way ANOVAs were used to assess potential group differences. Results revealed there were no significant differences on any of the error measures. The findings of this study suggest that shaming a novice during practice did not enhance or depress motor learning.

**Lauren Ovca**

## School of Architecture

*Energy Benefits of Restoration and Preservation of Historical Buildings*

Historical buildings are a portion of the architectural world. They add value to our communities and serve various purposes in our daily lives. With original construction dates at 50 years and beyond, one could say these buildings are in need of an update and it should be rebuilt to accompany modern advances in architecture.

The latest buzz throughout the architectural world has been sustainability. Instead of discussing exactly what sustainability is, a process in which the world would meet the needs of the present without compromising the ability of future generations to meet their needs, the question is, how will sustainability change the world. Whether the changes are significant, such as the use of solar panels, or as simple as installing Energy Star ranked appliances, positive effects can be seen. Some of the benefits include lower carbon emissions, lower energy costs, and the use of reusable energy such as geothermal energy and wind energy, to name a few (Carroon, 2010, p. 304).

With two seemingly opposite and unrelated ideas, historic buildings and sustainability, a new problem has presented itself. How will common ground be reached between historic constructions and modern systems of energy efficiency? Historical buildings may have missed the recent developments made in green design, but there is a way to bring them up to speed without compromising the historical value or creating an exorbitant cost.

**Arrealle Owens**

Department of History

*Breaking the Cycle: The Postsecondary Experiences of Women Receiving Government Assistance and Countering the Image of the "Welfare Queen"*

This study explored how utilizing government assistance influences the college experiences of women. This project considered women who have received TANF and other governmental subsidies including: childcare assistance, SNAP (Supplemental Nutrition Assistance Program) benefits, subsidized housing, Medicaid, WIC (Women, Infants and Children), job training, and employment. Moreover, this study focused specifically on women of color because they are often portrayed as the primary recipients of government assistance. By examining the college experiences of women of color who receive government assistance, this project countered the image of the lazy overly fertile "welfare queen" whose sole goal is to profit from the system by doing as little as possible (Hancock, 2004).



**Omari Owens and Aldwin Anterola**

Department of Plant Biology

*Expression of taxadiene synthase and taxadiene 5-hydroxylase in E. coli*

Taxadiene synthase and taxadiene 5-hydroxylase are the first two enzymes in the biosynthesis of the anticancer drug Taxol. Taxol comes from the bark of yew trees, which are unsustainable sources of the anticancer drug. To provide a future alternative source for Taxol, taxadiene synthase and taxadiene 5-hydroxylase were coexpressed in *E. coli* together with NADPH P450 reductase under different culture conditions, including incubation temperature, concentration of IPTG, time of extraction after induction, and addition of delta-aminolevulinic acid and thiamine. Hexane extracts were analyzed by gas chromatography mass spectrometry, which revealed formation of a side product cyclotaxane ether in all culture conditions tested, instead of the expected Taxol precursor taxadiene-5-ol. Therefore, I will have to conduct further experiments to achieve the goal of producing a Taxol precursor in *E. coli*, instead of a side product.

**Ivan A Perez and Kyle Goetzelmann**

Departments of Civil/Environmental and Mechanical Engineering

*Biofuel: Converting plants into “green” energy*

Investments into renewable fuel and energy have soared over the recent years, creating exciting opportunities for research and development. Inquisitive and innovative minds, young and mature alike, are working together across our nation and the world in order to alleviate the negative consequences of scarce and expensive fuel. A large area of interest is the development of “green” biofuels derived from feedstocks comprised of cellulosic biomass. Over the last several months we have been investigating the pretreatment of two different cellulosic feedstocks (corn fiber and sweet sorghum bagasse) using dilute sulfuric acid. This presentation focuses on comparing the effectiveness of dilute sulfuric acid pretreatment in decomposing the carbohydrates of these feedstocks into basic sugars, with that of lime pretreatment from our previous research. This comparison has been done by analyzing the sugar yield (mg sugars/ g solid) for each feedstock and pretreatment method.

**Madeleine Pfaff, Marie Tosa, Matthew Springer, and Dr. Eric Schaubert**

Department of Zoology

*Impact of deer bait sites on non-target small mammals in southern Illinois*

Bait piles are commonly used tools for hunting and wildlife research for animals such as white-tailed deer (*Odocoileus virginianus*), but their effect on non-target species has not received much attention. Alteration in distribution of supplemental food sources could have significant impacts on small mammal communities. We conducted a paired grid study to investigate the effects of corn bait piles on the deer mouse (*Peromyscus leucopus*) populations at two wooded sites in southern Illinois. We conducted a mark-recapture study from August to November of 2012 at two 8x8 grids with traps spaced 10 meters apart and placed a corn pile similar to those used for white-tailed deer research at the middle of one site. We trapped for 9 weeks for a total of 3,456 trap nights. All mark-recapture data were analyzed using the Huggins robust design model in program MARK, and models were compared using Akaike's information criterion. Capture and recapture probabilities of deer mice were highest during times when bait was present in the middle of the grid. However, the presence of bait did not affect survival or movement in and out of the population. These results indicate that the presence of a bait pile did not have a significant effect on the survival, emigration or immigration of the deer mice in my study. Although the presence of the bait pile did not directly affect small mammal survival, emigration or immigration in the wooded habitat where I conducted my study, it may affect non-target species in other habitats or seasons. Wildlife managers should be aware of possible impacts a bait pile might have on non-target species in various settings.

**Joshua Pogue**

Department of Chemistry and Biochemistry

*Responsive Polymer Brushes*

Responsive polymer brushes represent a promising tool for the efficient separation of complex proteins for research in a wide array of scientific disciplines. The objective of this project is to synthesize and characterize responsive polymer brushes. A well-developed method of synthesis will be utilized during this project, and several different methods of characterization will be explored in order to confirm the composition and function of the brushes. The expected outcome of this project is the accurate characterization of the polymer brushes. The proper characterization would have a major impact on current research, creating a dramatically more efficient method of protein separation. Dr. Colleen Scott will serve as the faculty sponsor for this project.

## **Lauren Pruemmer**

Department of Cinema and Photography

### *The Dream Project Presents: Burlytown Adventures*

Heralding the importance of basic human rights, the MDGs were set by the UN in 2000 as targets to help eradicate poverty and insure global development by the year 2015. For this project, I chose to explore the educational possibilities of television by producing a children's program highlighting Goal 1 of the United Nations Millennium Development Goals, Eradicate Extreme Hunger. The objective of my project is to empower children to realize their role as key components to positive change in the world. Using television as a familiar medium they can understand, I wanted to create a base of knowledge for children, helping them gain an understanding of the basic principles of Goal 1. I based the structure of my piece on a curriculum guide created by a foundation called "The Dream Project". The Dream Project is a group that works with schools across the country to teach students the necessity of respecting basic human rights and how those rights correlate to the MDGs. My program follows 5 year old Ashley Tatum, an imaginative young girl who spends her afternoons in the attic playing out fantasies as her alter ego, Detective Ace Tatum. Called into action by the Mayor of fictional Burlytown, Ace's abilities are put to the test when she has to solve the mystery of where all the color has gone in town. The story follows Burlytown's best detective as she finds that the lack of color is brought on by hunger. With a keen sense of observation and the help of friends along the way, Ace begins to learn how deforestation and overexploitation of farmland is to blame for the town's problem. The program then goes on to teach what deforestation and overexploitation are in terms that children in ages 4-6 viewing demographic can understand. Enlisting the help of resident absent-minded professor, Professor Noname, the pair, with the help of his assistant, Brumy, find that the solution is crop rotation, and Aces saves the day by delivering the news to Burlytown, where the color is soon restored.

**Erika Putz, Hansika Sirikumara, Jaime Bohorquez, Thushari Jayasekera**

Department of Physics, Southern Illinois University

*Band Engineering of Graphene via Controlled Chemical Doping*

Graphene, two-dimensional hexagonal lattice of carbon has tremendous electronic properties that may revolutionize the future electronics. For its real world applications, further improvements are essential. In this study, using high performance computational simulations, we calculated the possible pathways for engineering the electronic band structure of graphene by Boron and Nitrogen doping. Our calculations, based on the first-principles density functional theory show a possible band gap opening in graphene in the presence of Boron and Nitrogen.

Our results, which are also confirmed by the experimental observations, demonstrate the importance of the dopant concentration as well as the dopant pattern in engineering the electronic band gap of graphene.

**Rebecca Rea**

School of Art and Design, Art History

*Saudi Arabian Bedouin Bridewealth Jewelry*

The University Museum has a collection of 51 pieces of Saudi Arabian bridewealth jewelry that was donated in the 1980's. The jewelry was purchased in the markets in the region of Asir in Saudi Arabia. It was produced by Bedouins, a traditionally nomadic tribe that has lived in the deserts of North Africa and the Middle East for thousands of years. This specific collection is from the Arabian Peninsula, and the majority of the pieces were made in Saudi Arabia. Bedouins are referred to as the first Arabians, and are devout Muslims. Bedouin Bridewealth is called "mahr" in Arabic, and is typically paid in two stages by the groom. The first is to the bride's father, and is used to purchase wedding clothing for the bride, and livestock and housing for the couple after they are married. The second is paid directly to the wife in the form of jewelry. This bridewealth jewelry is the woman's property to do as she pleases. Typically, Bedouin women would display it proudly, but they can sell the jewelry if finances are needed. The jewelry is mostly made of silver, as this is a cheap, lightweight material that is easy to carry across the desert. Bedouin bridewealth jewelry contains several properties that are traditionally thought of as being protective. The jewelry in this collection contains some of these. This research investigates the material the jewelry is made from, the colors of the stones, and even the specific gems used, and what their significance is within Bedouin culture.

**Tanner Rehnberg and Joseph L. Cheatwood**

Department of Physiology, Department of Anatomy

*Growth Associated Protein 43 Expression after Stroke in Rats with a Soy Diet*

Dietary strategies implemented by people at risk for occlusive stroke have the potential to increase the response of stroke victim motor skills. Soy protein based diets have been shown to reduce lesion volume in rats post-stroke, as well as improve motor skills in the short term following the injury (Cheatwood, Burnet, Butteiger & Banz, 2010). The exact method of soy's intervention in the degradation process of the affected areas of the brain remains to be understood. One hypothesis maintains that the estrogen mimics daidzein and genistein, otherwise termed isoflavones, which bind to estrogen receptors in the brain represent the isolated components of soy that produce the beneficial effects previously noted (Cheatwood, Burnet, Butteiger & Banz, 2010). In this experiment, three groups of rats will receive three different diets. One will contain caseinate, the prominent protein in milk which has been shown to produce no substantial benefits to post-stroke rats. Another will contain soy protein isolate. The last will include a mixture of caseinate and the isoflavones daidzein and genistein. If the caseinate-isoflavone combination diet produces results similar to the proven benefits of a soy protein isolate diet and if both diets containing the isoflavones upregulate the expression of GAP43 mRNA, both the identity of the beneficial soy component and its function in post-stroke recovery will become clearer.



**Lilith Reuter-Yuill, Dr. Joel Ringdahl, and Dr. Sandie Bass-Ringdahl**

Rehabilitation Institute

*The Influence of Preexisting Skills on the Efficacy and Outcomes of Functional Communication Training*

Evidence suggests that Functional Communication Training (FCT) is efficacious in replacing problem behavior with socially appropriate communicative behavior. FCT modalities have included: Picture Exchange Communication System (PECS), sign language and speech. Importantly, a secondary benefit of FCT may be the emergence of vocalizations and verbalizations. There is paucity in research that evaluates this ancillary finding or the indicators that may predict individual modality success.

The current study examines the correlation between preexisting skill sets and the acquisition of FCT modalities through three phases: (1) Assessment of preexisting skill sets (2) Analysis of current language/communication status (3) FCT. Preexisting skill sets were evaluated by analyzing the participants' performance on the PLS-5, VB-MAPP, and Vineland. Language/communication samples were conducted with the Language Environment Analysis System (LENA). A priori statistical tests will include cross-correlation of dependent variables to calculate predictive power and treatment efficacy. These results will indicate variables of FCT modality success, independent acquisition of the modality system and vocal and verbal emergence. Conclusions will be discussed.

## **Roniqua Roundtree and Dr. Lisabeth DiLalla**

Department of Psychology

### *Does Parenting Style Affect College Students' Motivation and Academic Success?*

The number of students enrolling in college is increasing and the confidence of incoming freshmen regarding college completion is high (Strage & Brandt, 1999). Nonetheless, the proportion of students who actually graduate from college is declining (Strage & Brandt, 1999). Limited research has examined the effects parenting styles have on the academic success of college students. Studies have shown that the way a child is parented during childhood and adolescence can have both positive and negative effects on the overall well-being of the child even when they reach early adulthood (Steinberg, Lamborn, Dornbusch & Darling, 1992). The three parenting styles of authoritative, permissive, and authoritarian parenting each affect children's motivation, with authoritarian parenting having more negative effects and authoritative parenting having more positive effects. The purpose of this study is to assess how parenting styles experienced during childhood affect college students' motivation and academic success.

Previously, 46 undergraduate students completed questionnaires about their parents' behaviors and their own college motivation and GPA. Results showed that children of permissive mothers reported less striving for excellence, and students' desire to learn was greater if fathers were more authoritarian and less permissive. Expanding these relationships, data has been collected on a larger sample of 150 undergraduate students using a more user-friendly motivation questionnaire. The expectation is that students parented by authoritative parents perform better academically in college and are more motivated than those whose parents did not. In addition, I expect that authoritarian and permissive parenting of college students will predict lower levels of motivation and lower GPA. Lastly, I expect higher parental education and socioeconomic status to predict higher academic success among college students. These hypotheses were tested using Pearson correlations. Based on the results, parenting classes may help promote positive parenting skills and lead to better outcomes in college students.

**Allison Rump, Kristin Rosche and Vjollca Konjufca**

Department of Microbiology

*Distribution of Salmonella enteritica serovar Typhimurium in different regions of the spleen during splenomegaly induced by per oral or I.V. infection*

The spleen is a secondary lymphoid organ and is very important immunologically. Its primary function is to filter the blood and recycle red blood cells. The spleen also captures blood-borne pathogens and initiates immune responses to these pathogens. This is accomplished due to the concentration of immune cells that are present in the spleen. The spleen has three main regions: the red pulp (RP), the white pulp (WP) and the marginal zone (MZ). The RP is the outermost region and is where the blood is filtered and red blood cells recycled. It also contains F4/80+ macrophages which assist in pathogen destruction. The MZ is the area between the red and white pulp, in the MZ B-cells and other phagocytes are present to attack and destroy pathogens that have been captured. The WP contains a very high concentration of B-cells and T-cells. Infection with *Salmonella*, an intracellular enteric pathogen, causes enlargement of the spleen (splenomegaly). Here we characterized changes in the architecture of the spleen and cell distribution during *Salmonella*-induced splenomegaly. Regardless of the route of infection, intravenously (I.V.) or per oral (P.O.), splenomegaly occurred within days of infection. We found that the amount of immature red blood cells and F4/80+ macrophages increased greatly over eight days of infection. Interestingly, MZ macrophages, which express MOMA marker, decrease as splenomegaly progresses, completely disappearing by day nine. Colocalization of *Salmonella* with immune cells differs drastically from colocalization of *Listeria monocytogenes*, another intracellular pathogen. By day eight of infection with *Salmonella* it becomes impossible to distinguish RP, MZ, and WP due to drastic damage to the spleen architecture. Currently we are investigating how these changes in tissue architecture and cell distribution impact the immune responses to blood-borne bacterial pathogens.

## Alyssa Saylor

Department of Psychology

### *Heritability of Temperament and Peer Relationships*

When children are born, they have a certain style of interacting with their environment; this is known as temperament. Their reactions to stimuli can affect their environment, including peers and their relationships with peers. However, it is possible that temperament not only predicts a child's peer interaction style, but both may be controlled by some of the same genes. The purpose of the current study is to examine the shared genetics of temperament and peer relationships.

Sixty-five pairs of monozygotic (MZ) and dizygotic (DZ) twins were tested at age five and again one to eleven years later. From testing at age five, the approach and adaptability subscales of the Behavioral Styles Questionnaire (BSQ) were used to measure children's reaction and adjustment to novel situations. At follow-up testing, twins were randomly assigned to perform either an eye-gaze task or interview first, during which time the parent completed questionnaires. From the interview questions an exploratory measure of peer relationship quality consisting of *companionship*, *conflict*, *help*, and *closeness* was constructed.

I will first run a partial Pearson correlation to examine the relationship between approach and peer relationship quality, controlling for age at follow-up. I expect to find that scores on the approach scale will be significantly positively correlated with relationship quality. To examine the influence of genetics on temperament and peer relationships, I will run intra-class correlations for MZ and DZ twins. I will also run an intra-class, cross-twin, cross-lag correlation from which I expect to find a correlation between peer relations and temperament, which would demonstrate shared genes. These data are expected to demonstrate a genetic predisposition for how children interact with peers. This research can be beneficial to those who work with groups of children or to parents by aiding them in supporting children's social development.

**Kelly Schmidt**

Department of Biological Sciences, Pre-Medicine

*Effects of FOXO1 in e14.5 Mice*

Forkhead transcription factors are present in various tissues in the body, including the brain, vasculature, ovary, heart, and pituitary. They aid in development of various organs in the body. FOXO1 is necessary for normal development and function of several organs. An embryo lacking FOXO1 in the vasculature will terminate around embryonic day 10.5, which is approximately half way through development. FOXO1 is also found in the pituitary gland. Its role in the pituitary gland is not as clearly understood, as an embryo without FOXO1 in the pituitary will not terminate. The pituitary is responsible for controlling hormones throughout the body. FOXO1 controls cell proliferation, cell specification, and development in several tissues. I will run several experiments: BrdU stains, H&E stains, and growth hormone stains to gather results on FOXO1's effects on cell proliferation, specification, and morphology at age e14.5. These tests will help to show the role FOXO1 plays in the pituitary gland at e14.5. By better understanding FOXO1's role in the pituitary, specifically its effect on specification of cells into growth hormone cells and proliferation, we will be able to apply results to humans with various hormone-related ailments.

**Kevin Schrader**

Department of Physiology, School of Medicine

*The Effect of a Flax Seed Diet on E-Cadherin Expression in the Reproductive Tract of Hens*

E-Cadherin is a protein involved in epithelial cellular adhesion that has been found to be an indicator to the degree and development of ovarian cancer. The reason for using flax seed is because it contains omega-3, which is thought to have anti-cancer effects due to how omega-3 is an anti-inflammatory. This experiment was designed to study the relationship between E-Cadherin and how varying doses of flax seed affects the levels of expression and distribution in the oviduct of non-cancerous hens. The primary sources of data for this experiment were the results of DAB analysis of oviductal tissue sections. For 4 months, hens were given 0%, 5%, 10%, and 15% doses of flax seed. The oviduct sections from these hens were compared and the results show that there is not a direct link between the expression levels and the different levels of flax seed for such a short study. However, there is a notable difference between the E-Cadherin levels for the magnum of the oviduct and the ovary in non-cancerous tissues. This is important in showing that E-Cadherin levels in the ovary do not become relatively high in comparison to the oviduct until ovarian cancer has occurred.

**Morgan Schulte**

Department of Forestry

*Release rate of individual ESN Slow-Release Nitrogen Fertilizer prills based on mass and coating variations*

Slow release fertilizers are made to gradually expel the urea into the soil instead of one fertilizer application all at one time, mimicking a plant's uptake of the nutrient. The urea is encapsulated in a coating serving as a diffusion barrier, which allows water to be taken up into the prill or granule. The release happens in two parts. First, water diffuses into the prill and creates internal pressure. Then, the pressure accumulation causes the prill to swell and burst, releasing the mixture. The release appears random, even though the gradual timing is key. This study was conducted to test how mass and coating variations are factored into the timing of the release. When the urea is present in the water a response in electric conductivity appears. After taking diameter and weight data from 50 prills, they were crushed and added to 25mL of water. By crushing the prills, all the urea is released. Taking the electric conductivity of the solution shows the urea content variation in individual prills. Similarly, by soaking the prills in water the prills will release a urea solution, allowing them to function as designed. Taking electric conductivity readings for soaked prills over a period of 10 days, shows the timing variation of release rates.

**Rayvn Shelton**

Department of Communication Disorders & Sciences

*A New View on Code Switching*

This study examined written code switching from African American English to Standard English in college-aged individuals. An assessment was distributed to participants, which determined their proficiency in written code switching. The assessment was scored and analyzed according to demographic information provided. The research found a surprisingly limited proficiency in written code switching among the population.



**Cassandra Showmaker, Raquel Brown, Kanako Hayashi, and James A. MacLean II**

Department of Physiology

*RHOX homeobox regulation of Ins2 in granulosa cells of the ovary*

Homeobox genes are well-established transcriptional regulators of embryonic development, but their downstream targets have been relatively elusive. Here we characterize Ins2 as a downstream target of RHOX homeobox factors. While Ins2 is classically produced by islet cells in the pancreas, we found that the Ins2 gene is expressed locally in testis and ovary. In the testes, Ins2 requires RHOX5 to be expressed. However, in the ovary, Ins2 remains highly expressed in granulosa cells of Rhox5-null mice. RHOX5 induces Rhox8 expression in pre-antral granulosa cells and is relatively silent in peri-ovulatory follicles. However, Rhox8 does not peak until after the ovulatory LH surge when Ins2 reaches its maximal expression level. To determine whether RHOX8 regulates Ins2, we characterized the Ins2 promoter and discovered a critical homeobox binding element that was required for maximal transcription in granulosa cells. We propose that the induction of Rhox8 by progesterone, after the normal window of RHOX5 has passed, may explain why Rhox5-null female mice display apparently normal fertility, as RHOX8 may be capable of redundant stimulation of target genes that are essential for ovulation. Many RHOX-regulated genes identified to date encode proteins regulating metabolism. Thus, study of the Rhox cluster may provide a useful model in elucidating the mechanism by which diseases such as diabetes and metabolic syndrome result in reduced fertility.

**Ethan Snively, Jon E. Schoonover, and Natalia M. Mejia**

Department of Forestry

*The use of variable width buffers to reduce soil erosion in southern Illinois agricultural fields.*

According to the EPA, the top water quality impairment is the deposition of sediment in streams, rivers, and lakes. For the past forty years, Best Management Practices (BMP) such as riparian buffers have been the main approach for addressing this problem in agricultural settings, but recently have shown poor performance at controlling surface runoff due to the formation of concentrated flow paths (CFPs). A CFP is an area where surface runoff accumulates and creates a channel that bypasses the vegetation in the riparian buffer, decreasing the ability of these buffers to retain sediments and attenuate nutrients. In this project, variable width buffers were designed to provide an effective alternative to control CFP formation and to accommodate riparian buffer implementation to conventional farming techniques. Two variable width buffer designs were placed on two different sites at a private landowner's row crop farm located in the northern portion of Jackson County, IL. First, 20 ft buffers were planted along the entire stream corridor with native switchgrass. Then, at CFP locations switchgrass mixed with big bluestem blocks were planted at 60 ft increments beyond the 20 ft buffer into the agricultural field based upon CFP severity. The variable width buffer designs consisted of 4 CFPs with rip-rap protection coupled with an extended switchgrass/big bluestem buffer and 4 CFPs with only the extended switchgrass/big bluestem buffer. The CFPs channel dimensions have been surveyed monthly with a Total Station and surface runoff has been sampled via grab samples during storm events exceeding 1 in of rain or of sufficient intensity to generate runoff. Storm samples were analyzed in the Forestry watershed labs for total suspended solids (TSS). While preliminary results are not conclusive, we observed higher erosion rates at buffers without rip-rap protection, which tended to show signs of sedimentation and resistance to erosion.

Alexander T. Sougiannis<sup>1</sup>, Juliane P. Wallace, FACSM<sup>1</sup>, Buck Hales<sup>2</sup>

Department of Kinesiology<sup>1</sup>; School of Medicine<sup>2</sup>

*Competition vs. Practice Levels of Salivary Cortisol and Testosterone in Female USA Junior Olympic Volleyball Players*

The most effective training methods are those that attempt to parallel competition in an effort to best prepare athletes for competition. This involves the required physical movements and intensity to be simulated in the proper environment similar to the performance situation. The relative concentration of testosterone and cortisol can be used to determine stress levels in an athlete and be further used to suggest intensity of exercise. To date, very little research has focused on how well USA Junior Olympic Volleyball (USAV) coaches simulate the unique tournament style competition intensity and environment in their practice settings. **Purpose:** The purpose of this study was to compare practice and competition levels of salivary testosterone and cortisol in female high school club volleyball players. **Methods:** Nine (n=9) volleyball players (18 years) of a Regional USA Junior Olympic Volleyball team were recruited as participants in this study. Intensity was determined using salivary cortisol and testosterone concentrations over six collection periods; pre-season (resting), two practices and three competitive USAV Gateway Region tournaments. Participants provided 1.5mL of saliva in a cryovial at the end of each six collection periods. The samples were immediately frozen for later analysis using salivary ELISA (IBL International) and determined using interpolation on a standard curve. **Results:** Both salivary testosterone (150 pg/mL  $\pm$ 23.22) and cortisol (0.5530 ug/dL  $\pm$  0.0496) levels during tournaments were significantly higher than both practice (78.99 pg/mL  $\pm$ 10.38) (0.2600 ug/dL  $\pm$ 0.2566) and resting levels (60.126 pg/mL  $\pm$ 8.90) 0.3329 ug/dL  $\pm$ 0.6725) ( $p < 0.05$ ). **Conclusions:** It was found that both salivary testosterone and cortisol levels during tournaments were significantly higher than practice and resting levels. This indicates that the practices of the team are not properly simulating the intensity and stress experienced in a competition environment.

**Frank W. Soveg<sup>1</sup>, Cassandra Kontur<sup>2</sup>, Lydia Bright<sup>3</sup>, Santosh Kumar<sup>2</sup>, and Aaron Turkewitz<sup>2</sup>**

<sup>1</sup>Department of Zoology, Southern Illinois University Carbondale.

<sup>2</sup>Department of Molecular Genetics and Cell Biology, The University of Chicago. <sup>3</sup>Department of Biology, Indiana University, Bloomington.

*An Endosome-associated Rab Mediates Phagosomal Acidification and is Required for Efficient Digestion in Tetrahymena thermophila*

Rab GTPases function as molecular switches that regulate fusion and fission of vesicles in eukaryotic cells. Rabs are expressed as large gene families that coordinately control membrane traffic. The unicellular ciliate *Tetrahymena thermophila* expresses 63 Rab proteins, the same number that are expressed in humans. By localizing over-expressed GFP-tagged proteins, Bright et al. (2010) judged that seventeen of the *Tetrahymena* Rabs appear involved in the pathway of phagocytosis, but the roles of individual Rabs were not assessed. *Tetrahymena* Rab32, which is related to Rab32 in humans, appeared to be associated with all phagosomes. We have now elucidated the role of *Tetrahymena* Rab32 in phagocytosis, by studying both a gene disruption and a strain in which Rab32-GFP is expressed from the endogenous locus. Our results demonstrate that Rab32 is likely to mediate the fusion of endosomes with phagosomes, leading to phagosome acidification, and that this Rab32-associated step is important but not essential for the digestion of bacteria in phagosomes.

**Frank W. Soveg, Elliott Ziemann, and Agustin Jimenez.**

Department of Zoology

*The Taxonomic Characterization of Rhopalias Within the Echinostomatoidea Using Three Genetic Markers*

The genus *Rhopalias* includes six species of trematodes that infect didelphimorph marsupials. Traditionally, these organisms have been distinguished from related trematodes by the presence of two anterior proboscides armed with spines, which can be invaginated into a muscular pouch. However, their relationships with other families in the superfamily Echinostomatoidea remain unclear. Herein, we present a molecular analysis of *Rhopalias* aimed at explaining their taxonomic standing among the Echinostomatidae, and additionally we clarify the evolution of the proboscides and muscular pouches. Trematodes were collected in Illinois and Mexico from the Virginia and four eyed gray opossum. A fragment of each trematode's posterior end was excised and used to isolate DNA. We then amplified the following using PCR: mitochondrial cytochrome oxidase C subunit I (COX1), mitochondrial nicotinamide adenine dinucleotide dehydrogenase (ND1), and the nuclear internal transcribed spacer region (ITS). The remaining portions of specimens were stained and mounted on permanent slides for identification purposes. The three sets of nucleotide data were used in the construction of a datamatrix including homologous sequences available from Genbank. Sequences were aligned and analyzed using maximum likelihood as optimality criterion, and Bayesian inference was used to calculate the probability of tree branches. In addition, a coalescent model was inferred to reconstruct the species tree for *Rhopalias*. Our analyses suggest that *Rhopalias* is closely related to organisms in the families Echinostomatidae (*Isthmiophora* and *Petasiger*) and Cathemasidae (*Cathemasia*). Our findings also suggest a single origin for the proboscides and muscular pouches of *Rhopalias* within members of Echinostomatoidea.

**Ometere Topah, Hiral Patel, Laxmi Sagwan, and  
Aldwin Anterola**

Department of Plant Biology

*Site-Directed Mutagenesis of Taxadiene Synthase*

Taxadiene synthase is the first enzyme involved in the production of the anticancer compound Taxol, which is found in the Pacific yew tree (*Taxus brevifolia*). Its crystal structure depicts an active site that contains the amino acid tyrosine which is proposed to be involved in the final steps in the formation of taxadiene, a precursor to Taxol. Site directed mutagenesis of taxadiene synthase gene was done to change this tyrosine into lysine or glutamate in order to see how this change will affect taxadiene formation. Specific primers were used for the mutation of the gene which is carried by the pENTR plasmid. The mutated gene was transformed into *Escherichia coli*, and the plasmid was isolated from the transformed bacterial colonies grown in the presence of kanamycin. The mutated gene was transferred from the entry vector pENTR into an expression vector pGG-DEST using LR clonase to make pGG-TS. The plasmid pGG-TS was isolated and co-transformed with pIRS into *E. coli* grown in LB plates containing chloramphenicol (for pGG-TS) and spectinomycin (for pIRS). The double transformed *E. coli* was grown overnight in liquid LB broth containing both antibiotics. Induction was then carried out using 1M IPTG, 80% glycerol as additional carbon source, and sodium phosphate buffer to maintain the pH. After five days, the bacteria were extracted with hexane. Gas chromatography mass spectrometry was then carried out on these hexane extracts to see the effect of the mutation on taxadiene synthase formation. The observed activities for the mutated taxadiene synthases reflected a loss of activity with tyrosine to lysine mutation, but not when tyrosine was changed to glutamate.

**Jacob Walker**

Department of Electrical and Computer Engineering

*Using Programming to Optimize Bus Routes on Campus*

In programming, a genetic algorithm is a search heuristic that simulates the process of natural evolution. These types of programming have wide spanning applications in optimization and local minima search problems. More specifically, within the genetic algorithm domain is an example called the Travelling Salesman Problem (an NP-hard problem). The problem is that there is a traveling salesman who wants to visit a number of cities while traveling the smallest distance in order to optimize his route. He must visit every city at least once and then return back to his original starting city. By using combinational optimization math, with only a few cities it is easy to determine the shortest path. For example, if there were 4 cities, there would be 24 different combinations ( $4!$ ). However, as more cities are added it becomes nearly impossible to do the calculation by hand, this is where the genetic algorithm comes in.

The program creates two sets of different and distinct bus routes, each represented by a chromosome. By using evolutionary steps such as mutation and crossover between each chromosome, eventually the bus routes will “evolve” to become as optimal as possible. As a researcher, this project was to show how useful programming can be in solving everyday situations that may normally arise. Genetic algorithms have wide reaching applications in many different fields.

**William S. Welling and Mona Rahimi**

Department of Computer Science

*Development of a Web Service for Parallel Computing with an Item Response Model*

Item response theory is a popular approach used for addressing statistical problems in psychometrics as well as in other fields. The fully Bayesian approach for estimating item response models is computationally expensive. This limits the use of the procedure in real applications. In an effort to reduce the execution time, previous studies have developed a high performance Gibbs sampler for an item response model via the use of multiple processors. The aim of this study is to develop a web service for implementing such a parallel algorithm, which is written in the C language, so as to provide a tool for measurement specialists who do not have access to parallel computing resources. In particular, via the use of the Maxwell Linux cluster, which uses the message-passing model via the Message Passing Interface, we were able to develop a Hypertext Preprocessor web service utilizing Asynchronous JavaScript and Extensible Markup Language. The service connects to the Maxwell cluster and submits requests to execute the parallel algorithm on randomly generated or user-uploaded data. Upon completion, the cluster sends back the results to be displayed in the output window. Validations of input arguments were also conducted with the consideration of various possible requests to be submitted.



**Jill Winkelman and Dr. Nancy Mundschenk**

Department of Educational Psychology and Special Education,  
College of Education and Human Services

*Multi-tiered Systems of Support: Evaluation of General Education Preparation*

Multi-tiered systems of support (MTSS) is the practice of providing high-quality instruction/intervention corresponding to student needs, and using learning rate over time and level of performance to make important educational decisions. It is being implemented in schools to impact the learning of students with and without disabilities. MTSS integrates increasingly extensive instruction, reviews the student's progress, and then identifies whether or not students need additional intervention. MTSS consists of three tiers. Tier I interventions are delivered to all students in the classroom and include differentiated instruction. Tier II interventions are focused on specific skill development and are typically delivered in a smaller group setting. Tier III is the most intensive wherein individualized help is provided to a student who is significantly below expectations for academic or behavioral progress. It is critical that pre-service teacher candidates receive adequate instruction in the components of MTSS so that they are fully prepared to meet the diverse needs of students in their classrooms. The purpose of my study was to discover whether or not there has been a change in the level of skills and self-perception of pre-service general education teacher candidates in response to this current educational reform effort. In addition, this study investigated the relationship between pre-service teacher candidates' self-perceptions of their knowledge of MTSS and their performance on an assessment of key concepts of MTSS.

**Nicolette Winn, Ashley Wells, Farah I. B. Jayos, Amber Gilliam,  
Yara S. Artis, Dustin R. Nadler\*, & Dr. Meera Komarraju\***

Department of Psychology

*Gender Differences in Stereotypical Expectations of Leaders*

The current study sought to investigate gender differences in participants' perceptions of gender authority. Previous researchers have established that women show less explicit prejudice than men do (Rudman, 2000). Also, Phelan, Moss-Racusin, and Rudman (2008) as well as Nadler and Stockdale (2012), found that prejudice against women by males, in the form of both benevolent and hostile sexism, is a major component of employment discrimination. In the current study, 135 college students completed a survey containing the Gender and Authority Scale (Rudman, 2000) along with demographic information. It was hypothesized that there would be gender differences in gender authority expectations. Specifically, we hypothesized that male participants would endorse an expectation that males are more suitable in authority positions relative to females. An analysis of variance (ANOVA) was used to test for gender differences on the Gender and Authority Scale. Results indicate that male participants endorsed males in authority positions more frequently than did female participants. The results of this study support research on the barriers that women face in leadership positions and suggest that gender stereotypes and gender socialization processes influence our perceptions. Thus, women face a multitude of barriers when working to attain and succeed in leadership positions.

**Austin Wood and Mathew Wozniak**

Department of Cinema and Photography

*Vera*

The world around us gravitates toward the need for human connection. When this connection is broken we are left with isolation and grief. The cinema has always explored this need for human connection, whether it is through romance, comedy, or tragedy. Our goal is to create a short film that shows what happens to an individual when he or she is deprived of the essential need for communication, and placed into a perpetual state of grief. Films ultimately put each member of the audience through his or her own personal experience. When one watches a film, they place themselves in the position of the main character, using individual judgments to identify with the protagonist, as well as the film in its entirety. Our film will be a narrative drama that shows the main character going through the five stages of grief. Using the setting of a space station, our character's isolation and need for human connection becomes detrimental to his mental state. The reach grant allowed us to create a believable spaceship set that brings the film from a student level, to a professional level. We aim to create a visceral experience for the audience using the character's grief and need for human connection.

**Calvin Zimmermann**

Department of Sociology

*Mentoring Progressive Masculinities*

Progressive Masculinities Mentors (PMM) is an antiviolence group on the SIU Carbondale campus that promotes developing healthy masculine identities, learning about gender violence and prevention, other gender related issues, and going out into the community to do outreach at local schools. The purpose of this study is to examine the role of PMM in the lives of those who attend group meetings in “undoing” traditional gender scripts (Risman 2009). That is, but not limited to, PMM’s impact on their understandings of gender and related issues, and the benefits they have gained from being involved in the group. It is also to gather observational data about PMM. Qualitative methodologies were used for this project including focus groups and ethnography. The group of about 20 men and women was separated into five focus groups. A total of 13 members participated. Focus groups consisted of members who have attended PMM since last semester or before. Ethnography allows the researcher to gather data from sitting-in on and observing PMM meetings. Major themes and findings reveal how the group functions, why the group is important for college men, how dialogue at PMM is facilitated, how members grapple with material, how members apply what they have learned into community outreach, how members break and uphold gender boundaries during meetings, and how members narrate their experiences with PMM. Implications and suggestions for other universities to adopt similar programming that is tailored to their respective campuses are also noted.

## Undergraduate Research Opportunities at SIU

### **REACH (Research-Enriched Academic Challenge)**

This program offers competitive one-year Undergraduate Research/Creative Activity Awards to support original research, creative, or scholarly projects done with the guidance of a faculty mentor. Awards consist of \$1,500 grants combined with undergraduate assistantships of 10 hours per week. Students present project results at the Undergraduate Research Forum. For more information about the program and application materials, visit [reach.siu.edu](http://reach.siu.edu). You may also contact REACH staff in the Office of Sponsored Projects Administration in Woody Hall C-206, at 453-4540 or via email at [reach@siu.edu](mailto:reach@siu.edu).

### **Saluki Research Rookies Program**

This program offers competitive provides funds on a competitive basis for high-achieving freshmen and sophomores interested in conducting research and learning more about their intended major. Working with a faculty mentor, students plan a research project in fall semester to be carried out the following spring. Students receive an initial \$150 book stipend and earn a \$250 stipend if they successfully complete the program.

*More Info:* [srrp.siu.edu](http://srrp.siu.edu)

### **McNair Scholars Program**

This federally funded program offers graduate school preparation to students from diverse backgrounds, including first-generation college students. It provides mentoring, GRE preparation, and academic support. McNair Scholars take part in a summer research institute and present findings at a campus symposium and at conferences in their discipline.

*More Info:* [www.mcnair.siu.edu](http://www.mcnair.siu.edu)

## **Louis Stokes Alliance for Minority Participation**

SIU Carbondale is a member of the Illinois Louis Stokes Alliance for Minority Participation, a statewide coalition dedicated to increasing the number of underrepresented minority students in science, mathematics, and engineering. Funded by the National Science Foundation, this program provides paid, mentored research experiences for undergraduates on campus.

*More Info:* [www.ilsamp.siu.edu](http://www.ilsamp.siu.edu)

## **Undergraduate Assistantships**

The Undergraduate Assistantship program, coordinated through the Financial Aid Office, provides on-campus, paraprofessional employment opportunities for full-time undergraduate students with a cumulative GPA of 2.25 or higher. Students are able to work directly with a faculty member or professional-level staff member in a position related to their academic discipline or prospective career. Students are paid on a salary basis and work 10, 15, or 20 hours per week. A high percentage of assistantships entail working with faculty on research projects, so this is an excellent option for students interested in research.

*More Info:* [www.undergraduateassistantship.siu.edu](http://www.undergraduateassistantship.siu.edu)

**The Undergraduate Research Forum  
is part of REACH (Research-  
Enriched Academic Challenge),  
a campus-wide program for  
undergraduates coordinated by the  
Office of Sponsored Projects  
Administration at SIU Carbondale.**

**For more information, see  
[reach.siu.edu](http://reach.siu.edu).**