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Undergraduate Research Forum

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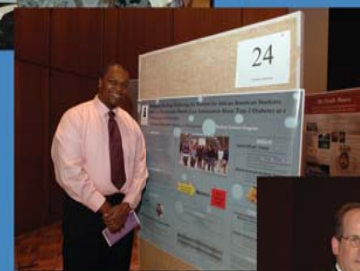
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The Undergraduate Research Forum is part of REACH (Research-Enriched Academic Challenge), a campus-wide program for undergraduates coordinated by the Office of Research Development and Administration at SIUC.

For more information, visit www.reach.siuc.edu.

UNDERGRADUATE RESEARCH FORUM

ABSTRACTS • 2011



Student Center Ballrooms
April 11, 2011
Southern Illinois University Carbondale

"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 SIUC 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

"I am very pleased to continue to be Involved with the REACH program and this year's Undergraduate Research Forum. As someone whose academic career began as an undergraduate researcher, I believe such opportunities represent singularly rewarding and motivating experiences for future success in academia and the world at large."

—Prudence M. Rice, Associate Vice Chancellor for Research and Director, Office of Research Development and Administration

Undergraduate Research Forum
April 11, 2011
Southern Illinois University Carbondale

Program

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

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

Award Presentations: 3:00 p.m.

REACH Director

Meg Martin, ORDA

Organizer

Heather Russell, ORDA

Sponsors

Office of the Provost

Office of Research Development and Administration (ORDA)

SPEAR (Students Promoting Educational Advancement and Research)

Poster Judges

Najjar Abdul-Musawwir, Art &
Design

Aldwin Anterola, Plant Biology

Kelly Bender, Microbiology

Lizette Chevalier, Civil &
Environmental Engineering

Michael Collard, Physiology

Buffy Ellsworth, Physiology

Eric Ferré, Geology

Jane Geisler-Lee, Plant Biology

Matt Giblin, Criminology &
Criminal Justice

Pam Gwaltney, University Honors

Michael Hoane, Psychology

Jodi Huggenvik, Physiology

Eric Jacobs, Psychology

Brian Lee, Chemistry &
Biochemistry

Derek Martin, Sociology

Walter Metz, Cinema &
Photography

Laura Morthland, Interior Design

Prema Narayan, Physiology

Gabriela Perez-Alvarado,
Chemistry & Biochemistry

Ruth Ann Rehfeldt,
Rehabilitation Institute

Karen Renzaglia, Plant
Biology/College of Science

Colleen Scott, Chemistry &
Biochemistry

Rhetta Seymour, McNair
Scholars

Sylvia Smith, Animal Science,
Food & Nutrition

Robert Swenson, Architecture

Matthew Therrell, Geography &
Environmental Resources

Haibo Wang, Electrical &
Computer Engineering

Greg Whittlede, Fisheries &
Illinois Aquaculture Center

Michael Young, Psychology

Student Participants**Mentors**

1. Ali Albayat, Kyle Barringer,
James Butler, Geoffrey
Daniel, & Joe Sobeski----- Alan Weston
2. Shant Alexanian----- Blaine Heisner
3. Kristin Allen----- Stephanie Clancy Dollinger
& David Gilbert
4. *Margaret Anderson----- Eric Holzmüller
5. Eric Anstedt----- Ruplal Choudhary
6. Brock Bailey----- Buffy Ellsworth
7. Marcus Bailey----- Mary Louise Cashel
8. Mindy Barnard
& Amber Sanges----- Matt Geisler, Jane Geisler-Lee,
& Andrew J. Wood
9. *Michael A. Beck----- Yong Gao
10. Trey Beckerman----- Jared Porter
11. Emily Berglin----- Kimberly Kempf-Leonard
12. Alexis Bergman----- Jesse Trushenski
13. Carol Burns----- Beverly Love
14. Blake Cain----- Andrew A. Sharp
15. Catherine Carney----- Gabriela C. Perez-Alvarado
16. Manuel Castaneda----- Michael Lydy
17. Elyse Clayton----- Michael Hoane
18. Richard Crossley
& Seth Knopp----- Jared M. Porter
19. Patrick Dean----- Kavita Karan
20. *Nicholas Defreitas----- Frank E. Anderson
21. Michael DeVinney, Jordan
Kabat, Josh Webb, Cory
Flicher, & Lee Peck----- James Mathias
22. *Antwuan Donley----- Mary E. Kinsel
23. Lindsay DuBois----- Stacy Thompson
24. Tiffany Dunsing----- Jane Workman
25. *Kirsten Eckstrum----- Brent Bany
26. *Kimberly F. Elsenbroek----- Sara G. Baer
27. Michael Emery----- Michael Hoane
28. Yuri Fedorovich----- Andrew A. Sharp
29. *Christin Fotis----- Matthew Geisler
30. Diamond Garner----- Ramon Rodriguez
31. Stephanie Geiser----- Brian Lee
32. *Lana Gosnell----- Kay Carr
33. Aubry Greenberg----- Peggy Stockdale

[cont.]

34. John Hamburg----- Peter Filip
35. Andrea Hartmann----- Michael Lydy
36. Dustan Heidel----- Harvey Henson
37. Adam Herwig----- Kim Harris
38. Megan Huebner----- Matthew Schlesinger
39. *Kelsey E. Jarrett----- Jodi Huggenvik
40. Jake S. Jasurda----- Buffy Ellsworth
41. Ashley Jordan----- Meera Komarraju
42. Kristen Jordan----- Marjorie Brooks
43. *Jordan Kabat----- Kanchan Mondal
44. Tamara Kang----- Daryl Kroner
45. Karla Keller Avelar----- Tammy Kochel
46. Elissia Kimball
& Chris Barth----- Robert Swenson
47. *Stephen Kocher, *Brandon
Veith, & *William Sedig---- Shai Yeshayahu
48. *B. Aneesa Lehman Gillum-- Eric Ferre
49. Erga Lemish----- Matthew Schlesinger
50. *Ryan Lichtenstein----- H.D. Motyl
51. Duane Lickteig----- Vjollca Konjufca
52. Mallory Lindberg----- Laura Murphy
53. Zachary Loconsole----- Chad Briggs
54. Evan McCrea----- Sara G. Baer
55. *Misty McElyea----- David Gibson
& Stephen Ebbs
56. Amy McReynolds----- Karen Midden
57. *Mary K. Meadows----- Judy Jordan
58. *Ivy A. Nickels----- Sedonia Sipes
59. Amanda Osborn----- Stephanie Clancy Dollinger
& Philip Burke
60. *Amber Owens----- Bakul C. Dave
61. Lucas Pulley----- Kathy Pericak-Spector
62. Rolando Quebrado----- Robert Kaps
63. Ruby Roknic----- Yanna Liang
64. Dacia Rush----- Elena Esquibel
65. Kasia Schaefer ----- Jane Geisler-Lee
66. Emily Seals----- Lydia Arbogast
67. Garrett Sendor----- David Gibson
& Sara G. Baer
68. Julia Sheffler----- Stephanie Clancy Dollinger
69. Lindsay Shupert----- David Gibson
& Stephen Ebbs

[cont.]

- 70. Keegan T. Smith----- Michael Lydy
- 71. *Anthony Sparer----- Matt Geisler
- 72. Nicole Spindler, Joan
Hansston, Dana Womick,
& Brittany Price----- Nancy Mundschenk
- 73. *Courtney Striker----- Michael W. Collard
- 74. Rebekkah Thomas----- Stephanie Clancy Dollinger
& Eric Jones
- 75. *Nathaniel J. Wachter----- David Gilbert
- 76. *LaCharles T. Ward----- Rachel A. Griffin
- 77. *Rosalind Whitley Mann----- Rodney Jones
- 78. *Kate Zimmerman----- Jesse T. Trushenski
& Sylvia Smith

*Recipient of a 2010-11 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 SIUC," 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

Louis Stokes Alliance for Minority Participation

SIUC 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.siuc.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.siuc.edu.*

Ali Albayat, Kyle Barringer, James Butler, Geoffrey Daniel, Joe Sobeski

Department of Electrical and Computer Engineering, Department of Mechanical Engineering and Energy Processes

Particle Flux Tracking in River Simulators

The Emriver model of river simulators produced by Little River Research & Design allows researchers and educators to study fluvial effects and sediment transport processes associated with rivers. The goal of this project is to create a system of sensors that will allow the flow of sediment particles to be measured as they move through certain areas of the simulator.

As water flows in a river, it ensnares portions of the surrounding sediment and transports them down the river at various velocities eventually depositing them at some point. Currently, there is a way to control the flow of water moving through the simulator, but no way to track the amount of sediment being ensnared and deposited. The sensors that our team designed measure how much of the sediment is passing by the sensor location in a given time frame. This ultimately increases the educational benefit of Emriver model simulators. The project explored the use of magnetic speed and position sensors, a camera-based optical sensor with software, magnetic separation and microcontrollers to accomplish this task. We were successful in using the camera-based method with software to identify, track, and analyze the particles. Additionally, an analysis of the results obtained using the sensors compared to results obtained from empirical formulas for sediment transport has been conducted.

Shant Alexanian

Department of Automotive Technology and Department of Mechanical Engineering and Energy Processes

Refrigerated Intake Charge Systems

Horsepower and fuel economy are words constantly thrown around in the automotive world. The common consumer looks at two major factors when purchasing a vehicle: horsepower and fuel economy. With government standards in the automotive industry also increasing, manufacturers are hard pressed to develop new methods of increasing fuel economy without decreasing horsepower. There have been incredible advances in vehicle efficiency with the introduction of direct injection and resonance tuning. Nonetheless, there is also room for continued improvement.

The objective of my research was to apply the principals of refrigeration to the intake charge of an engine in order to increase fuel economy and horsepower while decreasing NO_x emissions. Alongside the application of refrigeration, another objective of the research was to create a system that utilized existing components in a car to achieve the necessary refrigeration and minimize the complexity of the system. The results of my research yielded promising theoretical numbers. The refrigeration system that was designed showed a potential increase in horsepower of 3.4-6.5 percent. Hard numbers could not be established for fuel economy gains and NO_x emission reductions because the system is still in the prototyping phase, but conservative estimates and calculations show a potential fuel economy increase of 4.8% and a NO_x emission decrease of up to 9.4%. A prototype of the system is being designed and constructed in order to back the theoretical results.

Undergraduate Research Opportunities at SIUC

REACH (Research-Enriched Academic Challenge)

REACH provides one-year awards which are available on a competitive basis to undergraduates conducting research, scholarly, or creative projects under the guidance of a faculty mentor. Applications are accepted each January for the following academic year. Awards include a grant of up to \$1,500 to pay for expenses and a 10-hour undergraduate assistantship for fall and spring semester during the award term. Project funding begins in July.

For more information about the program and application materials, visit reach.siu.edu. You may also contact REACH staff in the Office of Research Development and Administration in Woody Hall C-206, at 453-4540 or via email at reach@siu.edu.

Saluki Research Rookies Program

This program, begun in fall 2008, provides funds on a competitive basis for high-achieving freshmen 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 a book allowance and earn a stipend if they successfully complete the program. *More Info: srrp.siu.edu*

McNair Scholars Program

This federally funded program prepares undergraduates from underrepresented groups, including minority and first-generation/low-income students, for graduate school. It provides special learning experiences, GRE preparation services, and support. McNair Scholars take part in a summer research institute and present findings at a campus symposium and at conferences. *More Info: www.mcnair.siu.edu*

**Kate Zimmerman, Dr. Heidi A. Lewis, Dr. Jesse T. Trushenski,
and Dr. Sylvia Smith**

Department of Zoology, Department of Animal Science, Food and
Nutrition

*Evaluation of a 'Soy Maximized' Feed for Hybrid Striped Bass
Production--Growth and Fillet Quality*

The objective of the project was to test alternative feeds for aquacultured hybrid striped bass, in order to increase sustainability of their feed sources and conserve valuable marine resources. However, fish that are fed a traditional marine ingredient-based diet have been found to contain more beneficial long-chain polyunsaturated omega-3 fatty acids, such as EPA and DHA, than fish that are fed a diet in which marine ingredients are replaced with plant-derived oils and proteins. We hoped to determine how selectively changing the diet of pond-raised hybrid striped bass from a primarily marine ingredient-based diet to a soy ingredient-based diet would affect fish growth and the fatty acid composition of the fillets.

Growth rates between soy-fed and marine-fed fish did not differ to a significant degree. Although the hybrid striped bass fed the soy diet did have decreased levels of EPA and DHA as compared to the fish fed the marine diet, the decrease was less than expected. While the soy feed contained less than 1/2 of the DHA and EPA levels of the marine-based feed, the soy-fed fish had fillet levels of DHA and EPA only 1/3 lower than the marine-fed fish. Additionally, fillets of fish fed the soy-based diet were more resistant to spoilage during refrigerated storage. These results are encouraging, suggesting that hybrid striped bass can be raised on primarily cheaper and more sustainable soy ingredient-based feed, while still retaining valuable DHA and EPA fatty acids within the fillets, and maximizing shelf life. Their nutritional value could be further enhanced by finishing with a marine-based feed for a few weeks prior to harvest. We feel our research could have impact on maintaining the health benefits of omega-3 fatty acids in aquacultured hybrid striped bass, while reducing the environmental footprint of the aquaculture industry.

Kristin Allen and David Gilbert

Department of Psychology

*Effects of Depressive Traits on Affective Priming of Lateralized
Emotional Word and Picture Identification*

Past research has shown that depressive traits and processing of emotional information may be mediated by lateralized brain mechanisms. Specifically, evidence suggests that the right hemisphere is more efficient in processing negative information and the left is more efficient in processing positive information. The current study compares the effects that depressive traits have on lateralized emotional word and picture identification in 20 male and 20 female college students. Participants were recruited through an introductory psychology class and the mean age was 19. Each participant answered a series of questionnaires relating to depression and then completed two tasks, a lateralized emotional word task and a lateralized emotional picture task. Preliminary analysis of the findings revealed a highly significant interaction of Emotional Valence with Visual Field, $F = 19.413$, $p < .001$, such that emotionally positive targets presented to the left hemisphere (right visual field) were perceived much more accurately (about 35.5%) than emotionally positive targets presented to the right hemisphere (28%). The percentage of emotional target stimuli correctly detected did not differ as a function of valence when they were presented to the right hemisphere (left visual field). These effects on valence and hemisphere were not moderated by high versus low MMPI Depression scores, though there was a trend in the predicted direction.

Margaret Anderson, Eric J. Holzmueller, Charles M. Ruffner, and John W. Groninger

Department of Forestry

Growth response of mature oaks following TSI and prescribed burning treatments

Oak-dominated forests are an integral component of southern Illinois natural resources. These forests were historically maintained by periodic, low intensity fires. However, over the past century, fires have generally been suppressed resulting in the increased abundance of fire intolerant species such as sugar maple and American beech and decreased oak abundance. Recent research indicates that timber stand improvement (TSI) and prescribed fire increase the regeneration of oak species and suppress the development of fire intolerant species. However, it is unclear how the residual oak trees respond to these treatments. In 2002, a study was initiated in southern Illinois to determine the effects of TSI and prescribed fire in oak dominated forests. Five sites were selected for analysis. Each site was divided into four units and randomly assigned one of four treatments: 1) TSI, 2) prescribed burning, 3) TSI and prescribed burning, or 4) no treatment (control). TSI treatments mechanically removed all undesirable trees such as sugar maple and American beech less than 8 inches. Prescribed burning treatments were applied in the spring of 2002 and in the spring of 2006. In 2010, we sampled ten randomly selected dominant (> 20 inches) oak trees from each treatment at each site to determine the effects of TSI and prescribed burning on residual tree growth. A tree core was extracted from each selected tree with an increment borer and radial growth over the study period (2002-2010) was measured. Preliminary results indicate that the thinning and burning treatments did not increase growth when compared to the control. Our results suggest that while thinning and prescribed fire may increase oak regeneration, additional management may be necessary to increase residual tree growth.

Rosalind Whitley Mann

Department of English

A Collection of Original Poems

This project involved rigorous reading, writing, and editing of poems and aimed simply to produce a small collection of publishable original work. I began this process in an intensive week-long workshop on revision at the Iowa Summer Writing Festival; poet and publisher Nick Twemlow reviewed our prior work and gave assignments that required us to attempt to “re-vision,” or re-visualize, our poems, in ways that surpassed and even flouted traditional editing. We gutted, dilated, and formalized our drafts in an effort to expand our flexibility and creativity. Through this experience, I learned to broaden and intellectualize my subject matter, and to write more precisely by relying on strong nouns and verbs and by parsing my syntax.

I have read widely and have finished over 75 books not included in my original reading list, which consists of every volume awarded the Pulitzer Prize since 1980, and have finished eighteen of the list titles. This survey of contemporary work has inspired me to experiment with many forms new to my repertoire, including the sestina, the villanelle, the prose poem, the long-line poem, and short line and short sentence poems, all of which vary thematically and employ both narrative and lyric modes. Thus far I have compiled fifteen typed pages of what my mentor Rodney Jones considers publishable work, and around eighteen typed pages of reasonably finished work that we have deemed worthy of further attention. Some of the writing has required little drafting, while other poems have demanded months of incubation and experimentation to fulfill their intended conceit.

I have submitted my first batch of five poems to both *The Atlantic Monthly* and *Poetry Magazine* for possible publication and have developed a strategy for submission which utilizes a chart to track submissions and prestige level of chosen magazines. As I complete this project, I return to promising older drafts to experiment with them formally, and, in later stages, to edit for clarity of syntax. I have developed range and discipline as a writer, along with an exciting and evolving body of work which I hope to disseminate.

LaCharles Ward

Department of Speech Communication

Let Their Voices Be Heard: The Visibility of Black Gay Men on Campus

This essay explores the dual/multiple oppressions Black gay men encounter on college campuses. Particularly, this article examines the ways in which Black gay men are marginalized by their Black male heterosexual peers because of their sexuality. Moreover, this essay highlights the ways in which race, gender, and sexuality intersect in the lives of Black gay men through 10 in-depth qualitative interviews. Additionally, this article examines the reactions to gay Black men by heterosexual Black men on campus. This analysis finds that gay Black men believe that they face more oppression because of their race, gender, and sexual orientation. Furthermore, many of the gay Black men expressed that when they are in heterosexual spaces they must act “straight” and/or lessen themselves (being less effeminate and flamboyant). Also, many of the heterosexual Black men felt that narrow constructions of masculinity contribute to how gay Black men are treated, especially in Black spaces. In regards to acceptance on campus, many of the gay Black men expressed that they felt welcome on campus with stipulations. Overall, the gay Black men articulated intersectionality (Crenshaw, 1995) vis-à-vis their lived experiences with being openly gay.

Eric Anstedt, Navneet Dogra, Ruplal Choudhary, Punit Kohli and Darcie Hastings

Department of Chemistry and Biochemistry

Determining the effectiveness of Curcumin-bound liposomes inhibiting the growth of E. Coli bacteria and investigating the ability of liposomes as a biochemical sensor

Polymerized liposomes are often used in sensing the presence of molecules and particles. They are very environmentally sensitive in their absorption values which make it easy to identify the presence of molecules bound to liposomes. The liposomes used in this experiment are PDA-NHS liposomes. They have a hydrophobic lipid bilayer that can encapsulate molecules or can bind molecules to the exterior surface. Curcumin is an alcohol that can be bound to liposomes that will prevent the growth of bacteria. In this poster, we will present our results on the change in absorbance as curcumin is bound to liposomes. We will set up four plates of bacteria with the same medium. One plate as the control, one plate with liposomes applied to the bacteria, one plate with curcumin applied to the bacteria, and one plate with curcumin-bound liposomes applied to the bacteria. We will observe which plate shows the greatest area of inhibition to determine the effectiveness of curcumin-bound liposomes to prevent bacteria growth. It is expected that the plate with the curcumin-bound liposomes will show the greatest area of inhibition. We have absorbance results showing the successful binding of curcumin to liposomes. Further experimentation is currently being conducted to determine the effectiveness of curcumin-bound liposomes as a bio sensor. If this experiment is successful in preventing the growth of bacteria, the practical application is to use the curcumin-bound liposomes on food products. The overall objective of this study is to find a way to improve the sterility of consumer food containers and prevent the dispersal of diseases through bacteria.

Brock Bailey, Adam Ploegman, Buffy Ellsworth

Department of Physiology

The Role of FOXM1 in Lactotrope Cells Proliferation during Pregnancy

The primary goal of our lab's study is to determine the molecular mechanisms affecting the development and function of the pituitary gland. Forkhead transcription factors, also known as FOX genes, have an influence on the development process. FOXM1 is a forkhead transcription factor and plays a key role in cell cycle progression peaking at mitotic phases S and G2/M. *FOXM1* expression is upregulated in many solid human tumors throughout the body. Most recent studies have demonstrated that *Foxm1* is essential for β -cell expansion during pregnancy in mice. Additionally, other studies have illustrated that lactotrope cells increase proliferation at the later stages of pregnancy in rats. Using information from both of these studies we hypothesize that FOXM1 plays a role in promoting cell proliferation in lactotropes during pregnancy.

Pituitaries were collected from female mice that had been injected two hours previously with BrdU, sectioned, then stained using immunohistochemistry (IHC). Pituitary glands of dams were collected when their pups were at embryonic day 9.5 (e9.5), progressive embryonic stages of pregnancy through e18.5, P0 (day of birth), and P21 (three weeks of age). Virgin mouse pituitaries were also collected for comparison. We performed IHC staining using BrdU, FOXM1, and PRL, performing cell counts at each stage of pregnancy.

Thus far, we detect an increase in cell proliferation of mother pituitaries peaking at P0. This is shown by a 10 fold increase from e12.5 to P0. Further, we see a gradual increase in cell counts in FOXM1 stains, gradually increasing to P0, then decreasing after birth. There is a 4 fold increase from e12.5 to P0 for this cell count. These stains reveal that there is a correlation between FOXM1 in lactotrope cell proliferation during pregnancy. PRL stains are still in progress. Further studies are needed including co-stains with BrdU/PRL, BrdU/FOXM1, and FOXM1/PRL. We will execute real-time RT-PCR to establish quantitative data for *Foxm1* expression at different stages of pregnancy. Furthermore, we will breed mice to eliminate the FOXM1 gene in the pituitary to ascertain how this will affect the lactation of mother mice.

We find there is an increase in pituitary cell proliferation peaking at P0 of pregnancy and correlating with an increase of FOXM1 cell expression at the same stage.

Nathan Wachter and Dr. David Gilbert

Department of Psychology

Effects of Nicotine and Emotional Priming on Ability to Inhibit Eye-Gaze Toward Emotional Stimuli in an Antisaccade Task

Saccadic eye movement tasks like the antisaccade task (AST) have been used over the past few years to test impulsivity and inhibition, especially in smoking abstinent participants. Previous works using antisaccade tasks have shown nicotine to reduce reaction times (RTs) compared to nicotine abstinence. This nicotine-associated improvement in cognitive and behavioral performance has been proposed to be reinforcing to the smoker. Previous research has also shown nicotine to reduce attention to and distraction by emotionally negative stimuli, which may account for some of the ability of nicotine to reduce negative affect. The present study combined these two ideas into an AST with emotional priming and target stimuli, while having a nicotine and placebo group of nonsmokers. The effects of nicotine on antisaccade performance were assessed in 14 male and 10 female college student nonsmokers. The participants wore a nicotine and placebo patch on separate, counterbalanced, days where they completed four antisaccade tasks each day. The task consisted of sequences that began with a prosaccade or antisaccade cue followed by an emotional priming picture and emotional target face. Findings revealed an expected main effect of Saccade Type (anti vs. pro) such that reaction times (RTs) to look away from the targets (antisaccades) were significantly longer (slower) than those associated with looking towards the targets (prosaccades), $F(1, 22) = 83.28, p < .001$. There was an overall reaction time shortening (speeding) effect of nicotine compared to placebo, $F(1, 22) = 4.403, p < .048$. However, most importantly, the effects of Drug (nicotine vs. placebo) interacted with Saccade type $F(1, 22) = 6.048, p < .022$, such that nicotine speeded RTs on antisaccade trials more than on prosaccade trials. The effects of nicotine, relative to placebo, were not influenced by the emotional valence of the priming picture or the target valence.

Rebekkah A. Thomas

Department of Psychology

When Do Jurors Dismiss Confidence Inflation?: The Role of Confidence Epiphanies and Evidence

A witness's confidence in his or her lineup identification can inflate over time, even when the witness has made an inaccurate identification. This tendency is problematic, because confident eyewitnesses heavily sway juries (e.g., Bradfield & Wells, 2000) and people have been wrongfully imprisoned by faulty testimony (see innocenceproject.org). Documenting an eyewitness's original confidence level immediately after identification can combat an eyewitness's inflated confidence during trial, but research shows that jurors ignore confidence inflation when an eyewitness provides a "confidence epiphany" explanation for it (e.g., "I have recalled other details...that have made me confident...;" Jones et al., 2008). Other conflicting research demonstrates that jurors discredit eyewitnesses who display confidence inflation, even if they provide a "confidence epiphany" explanation (Paiva et al., 2010). This study's purpose was to understand these conflicting responses to confidence inflation explained with a "confidence epiphany." Specifically, this research investigated whether the presence of evidence helps jurors rationalize confidence inflation explained by a confidence epiphany. Participants read one of six trial transcripts that manipulated the presence or absence of confidence inflation and corroborating evidence. Participants rated the witness's accuracy and credibility and the defendant's probability of guilt. The presence of corroborating evidence alone did not influence how mock jurors perceived the eyewitness's accuracy and credibility and the defendant's probability of guilt. However, when a third variable was evaluated—whether or not the mock jurors believed the eyewitness's confidence epiphany explanation—the hypothesized pattern of results occurred. When the eyewitness explained his confidence inflation with a confidence epiphany, mock jurors believed this explanation, and there was corroborating evidence; participants found the eyewitness to be both credible and accurate and perceived the defendant as more guilty. This research has implications for assessing the risk of wrongful convictions due to an eyewitness's confidence inflation.

Marcus Bailey

Department of Psychology

The Effects of Attention Deficit Hyperactivity Disorder and Conduct Disorder on the Formation and Maintenance of Peer Relationships

This study evaluated the extent to which youth enrolled in Special Education classrooms for emotional and behavioral disorders describe themselves as having peer related problems. It also assesses the extent to which youth perceptions of social problems are similar to those reported by their teachers. Finally, the extent to which social, attention and conduct problems all contribute to overall school adjustment were assessed. I analyzed a data set that includes self-reported information of how adolescents with behavioral disorders rate themselves among their peers and vice versa. Scores from the following two measures were used: the Index of Peer Relations (Hudson, 1997) and the Behavioral Assessment Scale for Children – 2nd Edition (BASC-2) Teacher Rating Scales. The data was collected from 30 students from Tri-County Special Education settings. The results indicated that youth in this study described themselves as having significant social problems. Social problems contributed significantly to overall school problems and youth ratings were stronger predictors than teacher ratings. The implications of this study for developing interventions for youth in Special Education settings are discussed.

MJ Barnard, Amber N. Sanges, Matt Geisler, Jane Geisler-Lee, Andrew J. Wood

Department of Plant Biology

*Purification and Characterization of cDNAs from the Rabbit's Foot Fern *Polypodium aureum**

Polypodium aureum (Rabbit's foot fern) is a good model species for the study of growth and development in plants. The fern is a perennial that can be clonally propagated by dividing the rhizome. The objective of our research is to purify and characterize unique cDNAs found within young fern fronds. Ligated cDNA libraries were used to transform chemical competent HB101 *E. coli*, and ampicillin-resistant colonies were isolated using X-GAL and IPTG for blue-white selection of vectors with inserts. Our strategy is to grow single, well-isolated bacterial colonies into 3 mL "overnight" cultures, extract plasmid DNA, digest the plasmid DNA with EcoRI restriction enzyme, and determine the presence and size of the cDNA insert using agarose gel-electrophoresis. The DNA sequence of fern cDNA insertions will be determined using a commercial DNA sequencing facility. To date, we have purified 6 cDNA-containing plasmids (awaiting DNA sequencing).

Courtney Strieker, Joseph Bulinski, Jodi Huggenvik and Michael W. Collard

Department of Physiology

Conditional Knockout of Deaf1 in Brain as a Mouse Model of Anxiety and Depression

Deaf1 is a transcription factor required for embryonic development in *Drosophila* and neural tube closer in mice. In humans, Deaf1 is associated with suicide and depression, cancer, and type-1 diabetes. Mice with complete homozygous knockout (-/-) of Deaf1 die at birth due to neural tube or brain defects. To overcome this problem and allow studies of behavioral changes from lack of Deaf1, we developed a mouse model where Deaf1 has been knocked out at embryonic day eleven in neuronal precursors. This is approximately one day beyond neural tube closer, so mice are expected to live. Female mice homozygous for the conditional knockout Deaf1 allele (Deaf1^{loxP/loxP}) are bred to male mice with a Nestin-Cre⁺; Deaf1^{+/loxP} genotype to produce NKO offspring. The precise genotype of this mouse line is Nestin-Cre⁺; Deaf1^{loxP/loxP}. Mice that have this genotype are abbreviated as **Neuronal homozygous Knock Out of Deaf1 (NKO)**, and the mice survived to weaning. The Nestin-Cre gene is specifically activated in CNS precursors resulting in homozygous deletion of the Deaf1 gene *primarily* in neurons. NKO mice underwent behavioral testing using the elevated plus maze and preliminary data indicates these mice have increased anxiety.

Nicole Spindler¹, Joan Hansston², Dana Womick¹

Department of Educational Psychology and Special Education¹,
Department of Curriculum and Instruction²

Exploring Implementation of Response to Intervention at the Secondary Level

In 2004, the Individuals with Disabilities Education Act mandated that all schools implement a response to intervention (RtI) model as part of the eligibility process for special education. A collateral effect of this process should be to limit or prevent academic failure among all students, and improve the quality of instruction in public schools. The purpose of the RtI framework is to decrease the percentage of students who are labeled as having a disability due to improper diagnosis and ineffective instruction. Although this approach has had a significant influence on student achievement at the elementary school level, less is known about its effects on students who reach high school and do not meet the academic standards for literacy, or those who are at-risk of academic failure. Our poster will summarize the current state of RtI at the secondary level.

Our purpose for this study was to explore the literature on implementation at the high school level by looking at five components and core principles of RtI: multi-tier implementation; development and sustainability of systems level capacity; maintenance of procedural integrity; and evidence-based interventions. These components have a direct impact on student achievement, and systems changes efforts at the school level. Essentially, we have looked at what schools are currently doing in their implementation of RtI and offer recommendations to promote student learning, and decrease the likelihood of false positives in the identification of adolescents with disabilities.

Although there is limited research on implementation, results indicate a lack of literacy skills significantly impedes student progress and growth, differentiated instruction in core academic subjects is rare, and professional development, particularly in the area of literacy, and data systems to monitor student progress during assessment are needed.

Michael A. Beck

Department of Zoology

Effects of Carbon Dioxide on Botryococcus braunii

Algae in recent years has stirred much interest in the area of alternative fuels and greenhouse gas reduction due to its rapid reproduction, its ability to fixate carbon dioxide and its ability to produce a form of oil that can be refined into biofuel. The main objective of our study focused on algae's ability to fixate carbon dioxide. More specifically, we examined how the introduction of 10-15% carbon dioxide, the density of most coal-fired power plants exhaust fumes, affects the growth rate of *Botryococcus braunii* in Modified Bold 3N Medium when compared to *Botryococcus braunii* that is not treated with excess carbon dioxide. The selection of *Botryococcus braunii* for the experiment was the result of a unique trait where it stores oil near the surface of its body making it of particular interest for future biofuel research. The experiment was run from 17 February 2011 to 17 March 2011. Cell density was measured using a cell counting grid plate where a sample was taken from each algae solution per day counting each cell individually. Algae seed samples were acquired from UTEX. The initial results of the research indicate that there is a significant difference in both visual interpretation and cell density between the growth rates of the carbon dioxide-induced *Botryococcus braunii* and the control *Botryococcus braunii*. The carbon dioxide-induced *Botryococcus braunii* grew 36% faster than the controlled sample with a higher density throughout the test.

Trey Beckerman, Ben Kerrigan, Dr. Jared Porter

Department of Kinesiology

The effects of using an external focus of attention when putting a golf ball

For more than a decade, experimental findings have demonstrated that directing a learner's conscious attention externally rather than internally improves motor skill learning and performance. The purpose of this study was to measure if increasing the distance of an external focus of attention improved learning and performance of a golf putting task compared to a baseline condition. We predicted that motor skill performance would increase as the distance of an external focus of attention also increased in relation to the participant. Participants ($N=40$) were randomly assigned to one of four experimental conditions (i.e. control, putter, ball, target). Participants in the control condition were not provided attentional directing instructions. Participants in the Putter condition were instructed to focus their attention on the putter when performing the task. Participants in the ball condition were instructed to focus on the ball when performing the task, and participants in the Target condition were instructed to continually focus on the target for the duration of the task. Volunteers performed a total of 30 practice trials in one day. During the practice phase of the experiment, participants were asked to repeat the prescribed instructions after every 5 trials. Participants returned after a 24-hour period of no practice for post testing. An analysis of post test performances indicated that all of the external focus conditions (i.e. putter, ball, target) performed significantly better than the control condition (i.e. baseline). Further analysis indicated that putting performance increased as the distance of the external focus also increases, thus the experimental hypothesis was supported. The results of this experiment provide converging evidence with previous research that increasing the distance of an external focus of attention improves motor skill learning and performance.

Anthony Sparer and Dr. Matt Geisler

Department of Plant Biology

Gene expression as a result of competition in Arabidopsis thaliana

Plant competition is not only important in the world of plant biology and ecology but is important to all of us who are dependent on agricultural food systems. If crops are planted too close, they compete for nutrients and sunlight, and as a result are less productive, and result in a lower yield. Crops planted at too low of a density would be an inefficient use of resources and land. This research hopes to shed light on this matter at a genetic level. *Arabidopsis thaliana* was used for this study as opposed an economically valuable crop because *Arabidopsis* is a model system, fast growing, easy to work with, and has a heavily studied genome. *Arabidopsis* plants were grown at 4 different densities and harvested for RNA extraction after 3 to 7 weeks growth depending on the set. Tissues were flash frozen in liquid nitrogen and stored at -80°C . In order to study gene expression, RNA was extracted and analyzed. This can be done through several methods. Microarray hybridization is a molecular biology technique that has been used previously to study competition expression (Geisler et al, submitted). While microarrays give a good overall picture of expression across the genome, they are expensive, limiting biological replication and data points, and have poor quantification compared to other methods. In this study, the transcripts of key selected genes will be analyzed using RT-PCR followed by gel electrophoresis, and quantitative (q)RT-PCR. In order to successfully complete qRT-PCR, it was needed to successfully optimize our newly designed primers by first doing the PCR using a DNA template. This was done successfully for 4 primer pairs, showing a band of increased size due the presence of an intron in the genomic copy of each gene. When performing RT-PCR on RNA, the presence of this larger band will indicate the presence of contaminating DNA, and thus act as a quality control before proceeding to qRT-PCR.

Keegan T. Smith, Amanda D. Harwood, and Michael J. Lydy

Department of Zoology

How does the sand composition of sediment influence pyrethroid bioavailability?

Pyrethroids have been detected in urban and agricultural systems at levels lethal to invertebrates in California, Illinois, and Texas. Therefore, it is important to be able to accurately predict their toxicity in aquatic environments. These predictions are complicated by the many factors which influence bioavailability. Bioavailability is the amount of chemical that can be taken up by an organism. One of these factors in benthic systems is sediment composition. Pyrethroids may have less of an affinity for sediments with greater sand composition, thus increasing bioavailability in those sediments. Understanding the role of sand composition in bioavailability is important for predicting the toxicity in these sediments. The objective of this experiment was to determine how sand composition affected bioavailability which could ultimately increase mortality. Increasing amounts of sand were added to reference sediment to produce five sediments with varying sand composition. Sediments were spiked with 100 ng/g permethrin and bioavailability was assessed using changes in sediment concentration, water concentration, desorption, and mortality. Permethrin desorption was measured using Tenax beads. Previous studies have shown that the amount absorbed by Tenax in 24 hours corresponded to the bioavailable fraction. As sand composition increased, more permethrin desorbed from the sediment increasing overlying water concentration and subsequently mortality. Furthermore, the amount desorbed, as measured via Tenax, strongly correlated to mortality, suggesting that increased desorption caused greater mortality. The greatest increase in these parameters was in the 100% sand substrate; this indicates that it only requires a small fraction of organic carbon to bind the permethrin and reduce bioavailability. Therefore, waterways with greater sand composition will have a greater proportion of pyrethroid bioavailable to biota causing increased environmental risk.

Emily Berglin and Dr. Kimberly Kempf-Leonard

Department of Criminology & Criminal Justice

Which came first? Serious Problem of Criminal Gangs or Federal Funding Targeting Gangs?

Although criminal youth gangs have always existed in the United States, it was not until the late 1980s and early 1990s that these groups and their members came to be viewed as a serious and escalating national problem. The chief concerns were that gang membership led to the proliferation of guns, violent crime, organized distribution of illicit drugs, and that many teenagers were compelled to join or risk harsh victimization by gangs. Movies such as *Colors* (1988) and *Boyz n the Hood* (1991) seemed to convey the realities of gang life and daily news coverage focused on drive-by shootings between rival gangs, graffiti depicting gang-related symbols, and robberies and serious assaults aimed at acquiring gang-related clothing or supplies. Anti-gang initiatives also flourished. Police targeted gangs and gang members and laws were enacted to increase penalties for gang-related crimes. Some local ordinances were passed to outlaw gang membership. Prevention programs also proliferated nationwide.

This project examines the temporal order between the moral panic over gangs in American society and the availability of resources to police and criminal justice agencies to address gangs. Data on the prevalence of gangs comes from surveys of law enforcement agencies in which departments report on the presence, characteristics, and behaviors of gangs in local jurisdictions, including large cities, suburban counties, smaller cities, and rural counties. The main source of this data is the National Youth Gang Center (NYGC). Resources targeting prevention and response to gangs are identified from annual reports by the National Institute of Justice (NIJ) that provide Congress with a full listing of awards during each fiscal year, including the name of the research or program. The findings of this “chicken or egg” inquiry raise questions about the processes by which policy responses to crime issues develop.

Alexis Bergman

Department of Zoology

*Soy oils in essential fatty acid and lipid nutrition of cobia
Rachycentron canadum*

A prominent fish in the aquaculture industry, cobia (*Rachycentron canadum*), receives a majority of energy and fatty acids to support normal growth and function from fish oil-based feeds. However, fish oil is a limiting and costly ingredient to use in aquafeeds. Finding a replacement for fish oil will ensure the successful expansion of the aquaculture industry, including cobia culture. This project seeks to determine the docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) requirements of cobia fed soy oil-based feed formulations. Soybean oil does not provide these essential nutrients, but can be a most cost-effective alternative to fish oil. By knowing the minimum requirements of these fatty acids, better feeds can be produced to maximize growth and minimize the inclusion of fish oil. Feeding trials were conducted at Virginia Seafood Agricultural Research and Extension Center to evaluate the use of EPA and/or DHA supplements in soy oil-based cobia feeds. After an 8-week feeding trial, growth performance was assessed. Statistical analysis indicated that soy oil-based diets supplemented with DHA could yield growth in cobia equivalent to fish oil-based feeds.

Lindsay Shupert, Misty McElyea, David Gibson, Stephen Ebbs, & Peter Filip

Department of Plant Biology, Center for Ecology

Effects of dissolved automotive brake dust solution on the growth and sequestration of heavy metals in Salvinia molesta Mitchell

Automotive brake dust (ABD) is expelled every day from vehicles when pressure is applied to the brake pedals causing the brake pads to rub together. The effect of this ABD on aquatic systems is unknown. In this experiment, the goal was to compare the growth of *Salvinia molesta*, a floating aquatic fern, cultivated in an ABD solution, with *S. molesta* grown in water. In addition, the bioadsorption or sequestration of heavy metals in the ABD solution by *S. molesta* will be quantified. Treatment solution containing powdered ABD and water was prepared. This solution was made to mimic what may happen to ABD released into aquatic systems. The ABD solution was placed on a shaker for 3 weeks to facilitate dissolution of the ABD. This ABD solution was analyzed using an Atomic Absorption Spectrometer (AAS) and found to contain Cu, Fe, Mn, and Zn. A negative growth response or inhibition of growth has been documented in plants exposed to heavy metals, such as those present in ABD. To see if this response may occur in aquatic plants exposed to ABD, the relative growth rate (RGR) of *S. molesta* grown in ABD solution was compared RGR plants in control solutions without ABD. After approximately 4 weeks, the level of bioadsorption by *S. molesta* will be quantified by measuring the levels of heavy metals present leaf tissues of the control and treatment plants using AAS. Results to date suggest that, contrary to expectations, *S. molesta* grown in the ABD solution exhibit a higher growth rate than plants grown in control solutions (i.e., more leaves and stem nodes, $p < 0.05$ in each case).

Julia Sheffler and Dr. Stephanie Clancy Dollinger

Department of Psychology

Habits and Lifestyles of Successfully Aging Women in a Rural Area

Older adults in rural areas have unique challenges to maintain well-being. The goal of this project was to examine factors related to successful aging in a sample of older women living in a rural area in the Midwest using both quantitative and qualitative methods. Mental and physical health, personality traits, cognitive abilities (i.e., working memory, vocabulary and attention), and activity levels were assessed. A semi-structured interview using a life narrative approach was used to explore habits, family relationships and lifestyles over the past 20 years. The women were administered the following measures: 1) BFI personality inventory; 2) the Florida Cognitive Activities Scale (Schinka et al., 2005); 3) Geriatric Depression Scale (Brink et al., 1982); 4) a series of cognitive tasks to assess working memory, vocabulary, and attention; and 5) the Identity Style (revised) measure. All of the women indicated that they felt they were aging successfully. Many of the women also reported having very healthy diets, moderate to high levels of exercise, and included many redemption sequences in their life stories (i.e., a negative event leading to an emotionally positive outcome). Current self-rated health was related with Extraversion ($r = -.45$), Openness ($r = -.36$), and Neuroticism ($r = .35$). Interestingly, the women's educational level was related to their current level of cognitive activities ($r = .39$) as well as depression scores ($r = -.36$). These findings present support for the importance of leading a healthy lifestyle and also indicate that many factors including personality traits as well as education may play a role in how well women age.

Carol Burns

Department of Radio-Television

The Portrayal of Black Women in Women's Magazines: A Content Analysis

After analyzing the June 2010 issues of Cosmopolitan, Essence, Sister 2 Sister, and Vogue magazines, the researcher found that Black women are not represented in mainstream media as often as white women and their portrayals seemingly take on a different role found in media targeted specifically for black audiences. Cosmopolitan and Vogue target a predominately white audience while Essence and Sister 2 Sister target a predominately black audience. Through content analysis, this research compared and contrasted images of Black women's features such as face, hair, skin tone, weight, clothing, and poses. Although there is a copious amount of literature related to portrayals of Caucasian women, there is not as much concerning African American women. The results of this study's analysis showed that Black Women were: slightly objectified in both white and black-oriented magazines; portrayed with more culturally specific features and larger body sizes. Stereotypical images stemming from mainstream and Black perceptions were also found.

Blake Cain and Andrew A. Sharp

Department of Anatomy

Sensory-Motor Integration in Early Embryogenesis

Sensory information and the responses that ensue from the information are necessary for life. It is known that sensory experience is required during development for proper neuronal circuit formation (e.g. the visual system), but it is not known when sensory experience begins to be required during sensorimotor development. Early in embryonic development the neural circuits utilized for sensorimotor output and motility are established, however, it is not clear when animals start to use this information to modulate their movement. Since embryonic chickens are easily manipulated and readily accessible (being that they develop completely *in ovo* rather than *in utero*), they make perfect candidates for behavioral and neural experimentation. Embryos start to finalize the circuitry needed for movement around embryonic day seven (E7). For example, the neurons needed for sensory feedback and motor output regulation start making synaptic connections to the spinal cord at E7.5. While data from our lab indicate that embryos are using some sensory feedback information at E9, it is not clear exactly when chicks start to use sensory information to modulate motor output and control movement. Using the E8 embryo, synchronous movement analysis and force generation measurements were made to explore this issue. It was hypothesized that the E8 embryo would be using sensory feedback to modulate its movement. Final data analysis of these data is currently being conducted.

Garrett Sendor, Juliette Donatelli, David J. Gibson, Sara G. Baer, Loretta Johnson

Department of Plant Biology

*Population Variation in Relative Fitness of *Andropogon gerardii* (Big Bluestem)*

Andropogon gerardii (big bluestem) is a warm-season, tallgrass prairie species common across the Midwestern United States. In this study, plants were grown in a common garden near SIU - Carbondale with seed collected from three populations in each of western and eastern Kansas, and Illinois to compare growth in the climate of southern Illinois. The objective of this study was to determine if fitness varied between the different population sources. Twelve seedlings, of four ecotypes per population source, were planted in 20 replicated rows within one of two plots in spring 2009 (n=240 plants); each plant was isolated by landscape fabric to prevent growth of other plants. Data were collected on the number of flowering and vegetative stems, and number of inflorescence branches on a subset of ten flowering stems per plant, for each of the 240 plants in fall 2010. Seed viability and germination tests were performed on seed collected from each of the twelve ecotypes. Results showed little difference in seed viability and number of flowering stems per plant between populations; however, Illinois ecotypes had a larger number of inflorescence branches per plant than ecotypes from the other two sources. The higher inflorescence branching for Illinois populations resulted in a larger seed output when compared with other populations, but with lower percent seed germination; this placed fitness (estimated as total germinable seed per plant) of the Illinois plants between the western and eastern Kansas populations. On this basis, the western Kansas populations had the highest fitness and eastern Kansas the lowest. These observations support the notion that the tested population sources reflect ecotypic differentiation of *Andropogon gerardii* across the Midwest from western Kansas to Illinois. These differences in fitness among ecotypes should be taken into account in using these populations as seed sources for Illinois tallgrass prairie restoration.

Emily Seals, Philip Jensik, & Dr. Lydia Arbogast

Department of Physiology

Analysis of steroid receptor inhibitor actions on the co-transactivation of the tyrosine hydroxylase promoter by androgen and progesterone receptors

The catecholamines, dopamine and norepinephrine, are neurotransmitters for major neuronal groups in the brain. Some of these catecholaminergic groups play important roles in reproductive behaviors and pituitary hormone release and are regulated by steroid hormones during development and adult function. The rate-limiting step in catecholamine biosynthesis is catalyzed by tyrosine hydroxylase (TH). TH activity is highly regulated at multiple levels, including at the level of gene transcription. The promoter for TH is regulated by testosterone and progesterone binding to androgen and progesterone receptors, respectively. Recent studies in this lab indicated interactions between these hormones by actions on the TH promoter. The aim of this study was to examine the influences of steroid hormone receptor antagonists on TH promoter activity, specifically examining the co-transactivation effects of androgen and progesterone receptors. A catecholamine cell line, CAD cells, was transfected with expression vectors for androgen and/or progesterone receptor(s) and the TH-1400-luciferase construct. TH promoter activity was analyzed with a dual luciferase assay. Cells were treated with testosterone and/or progesterone along with RU486, a progesterone antagonist, or flutamide, an androgen receptor antagonist. Progesterone or testosterone treatment alone caused 1.6-fold or 2.3-fold increase in TH-1400 promoter activity, respectively, whereas combined progesterone and testosterone caused a 3.6-fold increase. Treatment with RU486 completely blocked the ability of either ligand-bound progesterone or androgen receptors to increase TH promoter activity as well as the co-transactivation effect induced by hormone binding to both receptors. Flutamide, an androgen receptor inhibitor, exhibited similar effects. Current studies include treatment with bicalutamide, a second androgen receptor antagonist. These data suggest a molecular mechanism for interactions between progesterone and androgens on TH gene transcription that involves a co-transactivation effect within the -1400 bp fragment of the promoter, which is mediated by androgen and progesterone receptors and inhibited completely by steroid receptor antagonists RU486 and flutamide.

Catherine A. Carney, Pushpika S. Katugampola, Mateo C. Houle, Kyu Hong Cho, Brian M. Lee and Gabriela C. Perez-Alvarado

Department of Chemistry and Biochemistry

Structural Characterization of the HD Domain and the Correlation to its Metal-Dependent Enzymatic Activity

CvfA is a protein found in the pathogen *Streptococcus pyogenes*, which is the cause of many infectious diseases including pharyngitis, cellulitis and toxic shock syndrome. It has been shown by methods such as the silkworm model that CvfA is a regulator of bacterial virulence. Virulence factors such as hemolysin and bacterial capsules are expressed in the presence of CvfA and are the source of these infectious diseases. CvfA has three domains: a transmembrane domain, the hnRNP K (KH) domain, which is an RNA binding domain and the Hydrolase (HD) domain, which is a metal-dependent phosphohydrolase domain. We are interested in examining the metal-dependency of the HD domain and how it is correlated to CvfA structurally.

A combination of biochemical methods including gel electrophoresis, liquid chromatography, analytical gel filtration, UV-Visible spectroscopy and Nuclear Magnetic Resonance spectroscopy were used in our study of three proteins all containing the HD Domain. First, we isolated three different DNA sequences of the CvfA gene and cloned them into vectors designed for protein expression. We then optimized the conditions for over expressing the proteins in *E. coli*. Liquid chromatography was used to purify these proteins, which were then used for collecting Nuclear Magnetic Resonance spectra, helping to identify structural components of the protein. The three proteins are also being compared by checking the oligomerization states using analytical gel filtration. This structural characterization is helpful in determining the association between the configuration and the metal-dependent enzymatic activity of the protein. This enzymatic activity is being measured using UV-Visible spectroscopy and the preferred metal substrate is being explored using gel filtration and Nuclear Magnetic Resonance spectroscopy. Overall, these techniques and studies will provide a better understanding of HD Domains.

Manuel Castaneda, Sara Muetting, Yuping Ding, and Michael J. Lydy

Fisheries and Illinois Aquaculture Center, Department of Zoology

Individual toxicity of corn insecticides, tefluthrin and thiamethoxam, to two non-target species, Hyalella azteca and Ceriodaphnia dubia

Tefluthrin was the first pyrethroid insecticide designed specifically to be applied in soil on corn crops. This allowed for an immediate effect on pest organisms living directly in the soil. Seed coatings were recently introduced into the agricultural market and are used to prevent early season foragers from decreasing crop yield. Neonicotinoids, such as thiamethoxam, are the active ingredient in most seed coatings. Only a handful of studies have examined toxicity of these two compounds. In an effort to expose the toxicological effects of these two pesticides to non-target species, toxicity tests were conducted in water only and sediment systems. Amphipods, *Hyalella azteca*, and Daphnids, *Ceriodaphnia dubia* were the non-target species used for this study. Lethality was the endpoint of the test with an LC50 value indicating 50% mortality among a population of test organisms. Results indicated a much higher than expected tolerance level for organisms exposed to tefluthrin. An LC50 of 69.3 ng/g of tefluthrin and for thiamethoxam >10 µg/g was obtained in the *H. azteca* sediment test. Water only *H. azteca* LC50 values were 670 ng/L for tefluthrin and 869 µg/L for thiamethoxam. Water only *C. dubia* LC50 values were 114 ng/L for tefluthrin. The significance of these findings indicates measurable effects to non-target organisms when exposed to these insecticides. These data may provide an increased understanding of the environmental impacts that using these insecticides can cause.

Kasia Schaefer¹, Christin Fotis², Matt Geisler³, Jane Geisler-Lee³

¹Department of Physiology; ²Department of Horticulture; ³Department of Plant Biology

Building Baseline Information of the Rabbit Foot Fern, Polypodium aurem, for Scientific Research

When it comes to the field of genetics, very little is known about the fern family. This project is based on acquiring data on the rabbit foot fern, *Polypodium aurem* (Pa). The first aspect to study is the life cycle and germination of the plant. This can help determine what affects the plant in its haploid versus diploid state. In this project, the fern spores were germinated briefly under red light, followed more extensively by blue light in accordance with a successful experiment on the sensitive fern, *Onoclea sensibilis*. For the Pa, however, this was not as effective since the spores would germinate, but not divide beyond 5-7 cells. Looking more to the genetic side of the research, the beginning focus was on the ALDH gene. This is because it is a well known and well documented gene family among such plants as *Arabidopsis thaliana* (At), *Physcomitrella patens* (Pp), and *Oryza sativa*. Since plants on either side of the evolutionary fern contained this gene family, it seems likely the fern should as well. Since ALDH is well known, it allows for a wider base for comparison when searching for this family. A few hard found ALDH sequences in water ferns were used to compare ALDH sequences in At and Pp using bioinformatic tools like ClustalX. Furthermore, cDNA was constructed from Pa RNA using young fronds. Our next goal is to PCR clone Pa ALDH gene(s).

Dacia Rush

School of Accountancy & Department of Speech Communication

Studying and Socializing: Examining the Relationship between the Two

This study examines the relationship between studying and socializing and the effects that the two concurrently have on a student's study habits and performance in school. The purpose of this study is to determine if there is a correlation between studying and socializing and if so, what kind? The residence halls are where I chose to conduct this experiment. Hours of fieldwork, including personal observations and interviews with current residents, are the methods that I used in this study. For this study, I observed the environment of some residence halls in Thompson Point. From my own personal observations, I noticed that students have a habit of studying in the hallways or in the lounges as opposed to their own rooms. In addition to that, they tend to study in groups of two or more in these areas. To further explore my own observations, I interviewed college students who live in various residence halls on the college campus. The preliminary results disclose that there is a positive relationship between studying and socializing. When students study and socialize simultaneously, they are helping each other learn what the others do not know, so they are technically passing along information. Although focus shifts away from the studying sometimes, it still does more good than harm to study in groups.

Elyse Clayton

Department of Psychology

The Effects of a Pre-Treatment Regimen of Nicotinamide on Functional Recovery Following Traumatic Brain Injury in the Rat

Each year over 1.4 million Americans are victims of a traumatic brain injury (TBI) and approximately 50,000 of these injuries are fatal. Currently there are no approved pharmacological treatments for TBIs. The immediate effects that result after injury are severe loss of tissue leading to the tearing and shearing of axons that could result in permanent damage. Some secondary effects occurring after an injury is an overabundance in the release of a neurotransmitter glutamate, potentially leading to a toxic release in the brain. Previous work with nicotinamide (NAM), a soluble B-vitamin, has shown extensive preclinical effectiveness in rodent models of TBI. The purpose of the present study was to examine the ability of NAM pretreatment to improve recovery of function following TBI. Two days prior to the injury, male rats were given two injections of NAM (75 mg/kg, ip) or 0.9% sterile saline per day (9am, and 6pm). The last injection was given 30 min prior to injury. Rats were prepared with moderate unilateral cortical contusion or sham procedures. This created 3 experimental groups: NAM-treated, Saline-treated, and Sham. Starting two days post injury, animals were tested on a number of behavioral tests used to assess their motor (Rotor-rod) and somatosensory functioning (Dots and Grid). The animals were also placed in a Morris Water Maze to test their reference and working memory. Following the testing period, the rats were sacrificed and their brains processed for lesion analysis. Pretreatment with NAM resulted in significant improvements in somatosensory and motor functioning; however, there were only limited effects on the cognitive tasks. The results of this study suggest that pre-treatment with the vitamin NAM may provide a reasonable degree of neuroprotection in the event of a TBI.

Richard M. Crossley, Seth W. Knopp, Jared M. Porter

Department of Kinesiology

Directing Attention Externally Improves Performance in Low Skill Sprint

For nearly fifteen years researchers have investigated how the focusing of conscious attention influences motor skill execution. This line of investigation has consistently demonstrated that directing attention externally rather than internally improves motor skill learning and performance. The purpose of this study was to test the prediction that low skilled sprinters completing a 20 meter dash would run significantly faster when using an external focus of attention rather than an internal or no-focus of attention. Participants were college-aged volunteers with no prior sprint training. This study used a counterbalanced within-participant design. Each participant completed three days of testing, with each day utilizing a different focus of attention (i.e., internal, external, or no-focus control). The internal instructions stated while you are running the 20 meter dash focus on driving one leg forward as powerfully as possible while moving your other leg and foot down and back as quickly as possible as you accelerate. The external instructions stated while you are running the 20 meter dash focus on driving forward as powerfully as possible while clawing the floor with your shoe as quickly as possible as you accelerate. The control group was told please run the 20 meter dash. Running times were collected using infrared timing gates. Data were analyzed using a 3 (condition) x 3 (trial) repeated measured analysis of variance (ANOVA). The results of the ANOVA indicated that the trials completed in the external focus condition were significantly faster than trials completed in the internal and control conditions. The analysis also indicated that the control and internal conditions were not significantly different. The results of this study extend the findings of previous research and demonstrate the sprinting performance can be improved by using an external focus of attention.

Ruby Roknic

Department of Civil and Environmental Engineering

Ethanol production from soybean meal through yeast fermentation

Soybean oil represents a dominant raw material for biodiesel production in US. The by-product, soybean meal, however, has been treated as a cheap commodity, either as animal feeds or fertilizer. While most of the proteins and fibers in soybean meal are beneficial for animals, the soluble sugars, however, are the main reason for making the meal a low value product. Soluble carbohydrates in the meal consist of sucrose, stachyose, and raffinose. Sucrose is a disaccharide consisting of glucose and fructose. Raffinose is a trisaccharide composed of galactose, glucose, and fructose linked in that order. Stachyose is a tetrasaccharide comprising galactose, galactose, glucose, and fructose. Except sucrose, raffinose and stachyose are indigestible by native gastrointestinal enzymes of monogastric animals, but are digested in the lower bowel by microorganisms generating gas, intestinal discomfort, and laxative effects.

This project seeks to convert the oligosaccharides in soybean meal into ethanol through sugar extraction and yeast fermentation. Ethanol production rates from sugars extracted under different conditions and treated at different conditions will be calculated and compared. An ethanol yield from soybean meal will be presented. This study represents a novel approach for utilizing agricultural by-products to produce value-added chemicals and fuels.

Rolando Quebrado

Department of Aviation Management

Educational Requirements for a Career in a Class III and Class IV Airport Management

The majority of education and curriculum for a career in Airport Management is identified by airport managers in large metropolitan airports. A total of 25 airport managers in a Class III and Class IV airport facility were asked to categorize 26 courses in three educational areas (general, aviation, and management) signifying if the course should be required, or if it was not necessary. The second part of the survey asked managers to rank the top 10 essential courses, and also add additional input or comments regarding this issue. I compared the results with the curriculum listed with the University of Aviation Association (UAA, 2010) and to a previous survey conducted by Kaps and Widick (1995). Findings from this study will inform curriculum requirements for managers at Class II and Class IV airport facilities.

Patrick Dean

Department of Cinema and Photography

Sports, Marketing, and Advertising - A Content Analysis of Advertisements on the 2011 Super Bowl

There are growing links between sports, advertising and entertainment. The English Premier League, World Cricket, Formula 1 racing and Super Bowl are some of the most high profile events with interest across the world. Marketing through sporting events is becoming one of the most important channels for reaching large numbers of people, especially with the increased interest in some of the popular sports, relayed through mass media and the Internet across the world. Millions of dollars are being spent through sponsorships, advertisements, brand promotions, merchandising, etc. One of the most important is the Super Bowl, the major game of the National Football League of the United States. Rated highly by the Nielsen ratings, it was estimated that over 90-120 million viewers watch the Super Bowl every year. It also attracts some of the most spectacular, innovative and the most expensive advertisements (Chuck, Yelkur & Christian, 2001; Siefert, Kothuri, et al. 2009; Wu & Newell, 2003). The 2011 Super Bowl event in February, on which this study is based, also attracted extensive advertising and media coverage. Through a theoretical framework, this research project used the case study and content analysis methods of data collections (Reinard, 2001, Wimmer and Dominick, 2006; Yin, 1994). The content analysis of 101 advertisements on the Super Bowl 2011 done across more than twenty variables reflected the trends of marketing not only products but also many services and even movie trailers. The findings reflect the growing shift in the coverage, popularity and importance of advertising and sports, as a premier event in promoting products across the world, the use of humorous themes, use of celebrities and innovative strategies, targeting one or multiple audiences, all of which make Super Bowl one of the biggest sports, entertainment and marketing events in the U.S.

Nicholas Defreitas and Frank E. Anderson

Department of Zoology

Reevaluating the Phylogeny of Polygyridae, a Group of Common North American Forest Snails

Polygyridae is a diverse group comprising over 300 species of relatively large North American land snails in 23 genera, with most species found in the eastern U.S. Polygyrids are an important component of deciduous forest food webs, feeding primarily on decaying plant matter and in turn serving as prey for other land snails, birds, small mammals, and salamanders. These snails are abundant and conspicuous in eastern North American deciduous forests, but evolutionary relationships among and within the polygyrid genera remain confused. To clarify evolutionary relationships in Polygyridae, a collaborative molecular phylogenetic study has been initiated in which multiple genes will be sequenced and compared across all available polygyrid species. As part of this effort, we collected snails in southern Illinois and eastern and central Tennessee, and additional specimens, DNA and gene sequences have been provided by collaborators at the Great Smoky Mountains National Park, the University of Wisconsin La Crosse, the Carnegie Museum of Natural History and the University of Louisiana at Monroe. We have sequenced regions of four mitochondrial genes (cytochrome c oxidase subunit I, cytochrome b and the small [12S] and large [16S] ribosomal RNA subunits) from 35 snails representing 22 species and 13 genera, combined these data with sequence data from representatives of five additional genera provided by collaborators, and analyzed the data using maximum likelihood methods. Evolutionary trees resulting from analyses of these data shed light on polygyrid relationships, provide a foundation for future investigations of the evolution of morphological traits and reproductive behavior in Polygyridae, and will serve as a basis for a taxonomic revision of the group.

Lucas Pulley

Department of Mathematics

Analyzing Predator-Prey Models Using Systems of Linear Ordinary Differential Equations

The main operating concern of all species in any ecosystem or natural environment is rooted in the battle for survival. This constant battle for survival is most highlighted in the two main modes of species interaction, categorized as predation or competition. This research focused on applying biological mathematics to analyzing predation relationships, especially the relationship between the Canadian Lynx and the Snowshoe Hare. This predation relationship is quite special, because these species interact in a relatively isolated manner compared to others, meaning their populations fluctuated in a regular cycle. These population fluctuations can be defined and analyzed mathematically using systems of linear ordinary differential equations, built of course upon several minimizing assumptions in order to exclude incalculable variables. One of these models is the Lotka-Volterra Model, which was reformulated and analyzed in this research. By applying the Lotka-Volterra Model to the predator-prey relationship between Canadian Lynx and the Snowshoe Hare, it is discovered that their populations fluctuate on average ten-year phases. Predator-Prey population cycle charts, as well as direction fields of the system, were analyzed. This model was then compared to other real life models, like the Kermack-McKendrick Model and the relationship between fish and sharks in the Mediterranean. Future research could expand on the Lotka-Volterra model by accounting for variables like hunting, natural disaster, epidemic, or other predators. This research is important in biological fields studying predation, especially when predation leads to species endangerment or yields intense coevolution.

Amber Owens and Bakul C. Dave

Department of Chemistry and Biochemistry

The Utilization of Antimicrobial Organosilica Sol-Gel Materials for the Implications Concerning Biomedical Products

Silica gel materials have interesting applications such as controlled drug release, metal anticorrosion, and separation of charged particles. Sol-gels are highly porous and can be tailored to specific applications by incorporating organic functional groups. By taking sol-gel coatings and applying them to specific surfaces, we are able to inhibit microbial growth on not only surgical equipment but also the surrounding environment and steel implants as well. This should help eliminate bacterial growth and help eliminate the possibility of infections within a sterile hospital environment. The application of a thin antimicrobial coating increases surface smoothness and hydrophilic properties, which in turn could decrease the risk of bacterial colonization and lessen the probability of infection. The purpose of this study is to chemically control microbial growth by manipulating sol-gels surface coatings with an optimal number of amine functional groups within the silica network from a Methyltrimethoxysilane (MTMOS). The results support the hypothesis in showing a decline of microbial growth for coated samples as compared to controlled samples. UV analysis of the agar bacterial mixture indicates a reduced level of growth for the coated samples by showing low levels of absorbance; therefore, the higher the absorption levels, the more microbial growth present within the agar mixture. Test samples were further investigated at wavelength 500; both steel and tile coated samples exhibited decreased levels of microorganisms as compared with controlled samples.

Michael DeVinney, Jordan Kabat, Josh Webb, Cory Flicher, Lee Peck

Department of Mechanical Engineering and Energy Processes

Validation of CFD Turbulence Models for the Boeing Company

The design of an aeronautical heating, ventilating, and air conditioning (HVAC) system is an involved process with many considerations. To design these networked systems, engineers rely on large scale wind tunnel tests to provide accurate results. This may be especially damaging when other airplane subsystems change the overall HVAC network and multiple scale models must be created, often taking months to construct and test. To circumvent this, engineers utilize computer simulations to hone the design and therefore limit the amount of wind tunnel testing required. However, computer simulations have a limited accuracy and must be validated through benchmark experiments if to be used in industry. In particular, an appropriate turbulence model must be chosen and a geometric mesh must be optimized to ensure the highest accuracy.

The research carried out was to provide a benchmark validation study to the engineers at Boeing for the design of aeronautical HVAC networks. A wind tunnel apparatus was constructed to measure the pressure drop and recovery through a 6" to 1" T-fitting with a flow restricting orifice on the 1" branch. This apparatus was designed and constructed to approximate the conditions found in Boeing airplanes and provide a simple geometry for simulation comparison. The flow rate achieved through the wind tunnel was 375 cfm with approximately 5% of the flow through the 1" T-fitting with a pressure drop of approximately 0.5 inches of water across the orifice.

The experimental results of pressure drop and pressure recovery were then compared to the simulations carried out on the software package FLUENT. Multiple meshing schemes and appropriate turbulence models were then used to determine the most accurate way to simulate this highly turbulent flow. Multiple simulations must be carried out before a conclusive error comparison with the experimental data can be made.

**Antwuan M. Donley, Drs. Gary and Mary Kinsel, Dr. Punit Kohli,
and Brandon Luster**

Department of Chemistry and Biochemistry

Investigation of Matrix Modified NALDI Mass Spectrometry

In the late 1980s, matrix assisted laser desorption ionization mass spectrometry (MALDI-MS) was introduced to analyze peptides, proteins, oligonucleotides, and polymers. Variations of MALDI-MS have been developed, including desorption ionization on porous silicon mass spectrometry (DIOS-MS) and nanowire-assisted laser desorption ionization mass spectrometry (NALDI-MS). The primary objective is to enhance the NALDI-MS technique by introducing a very thin film of MALDI matrix onto a nano-structured surface in order to achieve more efficient ionization. Peptide/protein mixtures containing Bovine insulin B chain (3495 Da) and Bovine insulin (5733 Da) in the presence of Bradykinin fragment 2-9 (904 Da), Angiotensin I (1296 Da), [Glu¹]-fibrinopeptide B (1570 Da), Adrenocorticotrophic hormone fragment [ACTH] 1-17 (2093 Da), and ACTH fragment 18-39 (2464 Da) were optimized. The optimized protein/peptide mixture contained 5.0 pmol Bradykinin fragment 2-9, 10 pmol Angiotensin I, 6.5 pmol [Glu¹]-fibrinopeptide B, 0.1 pmol ACTH fragment 1-17, 7.5 pmol ACTH fragment 18-39, 70 pmol of bovine insulin B chain, and 44 pmol of bovine insulin. The mass spectrum data showed all of the peptides, along with the bovine insulin B chain and bovine insulin ion signals. The next step of the experiment will consist of introducing this optimized mixture to NALDI. We will then determine if the peptide/small protein desorption ionization efficiency can be improved by adding a MALDI matrix onto the nano-structured surface.

Amanda Osborn

Department of Psychology

Effects of Affect Induction on Creative Problem Solving

The current study examined the effects of positive and negative affect induction procedures on creative problem solving. Participants were randomly assigned to one of two groups, in which they completed identical creative problem solving tasks. The two groups experienced two forms of affect induction. The first form of affect induction took place prior to the task. The participants wrote about an autobiographical event that has happened in their lives; the positively induced group wrote about a happy experience while the negatively induced group wrote about a sad experience. Once completed, participants were exposed to the second form of affect induction during the completion of the creative problem solving tasks. The second form of affect induction was a modified version of the Velten Mood Induction procedure (Velten, 1968) presented as a recording. The effects of the affect induction procedure were measured through a self-report measure of affect in a pre-post test design. The objective of this study was to examine which affect induced state, if any, better facilitated creative problem solving. The results of this study provide insight on how positive and negative affect can influence creative problem solving.

Ivy A. Nickels, Elizabeth Saunders, Sedonia Sipes

Department of Plant Biology

*A methodology for the propagation of *Abronia* species*

Abronia is an herbaceous genus of desert plants whose approximately 19 species vary greatly in morphology and habitat. Most *Abronia* species are endemic to western North America, and several are listed as rare on federal and/or state lists. The species are notoriously difficult to germinate, and developing a germination protocol is necessary for implementing conservation plans for rare species. Previous work showed that ethephon, a plant growth regulator, successfully broke seed dormancy in *Abronia umbellata*. We empirically determined optimal ethephon concentrations, photoperiods, and other germination parameters for seven *Abronia* species: *A. ammophila*, *A. elliptica*, *A. fragrans*, *A. mellifera*, *A. turbinata*, *A. villosa*, and *A. umbellata*. Seeds of each species were subjected to three ethephon concentrations (10 μ m, 50 μ m, and 100 μ m) and 3 lighting treatments (24 hours dark, 24 hours light, and 12 hours dark/ 12 hours light) were applied using a randomized design. Optimal light conditions varied across species: 43% of species preferred 12 hours of dark/ 12 hours of light and 57 % of species preferred 24-hours of darkness. Optimal ethephon concentration also varied as a trend across species: 28.5% of species preferred 10 μ m, 43% of species preferred 50 μ m, and 28.5% of species preferred 100 μ m. Germinated seed were potted in desert media mix and moved to the greenhouse. We have successfully grown *A. fragrans* to flowering adults, but a challenge remains to transition seeds of other species to successful seedlings. Developing a successful methodology to raise *Abronia* will help to ensure the preservation of this genus.

Lindsay DuBois

Department of Curriculum and Instruction

What is Quality Pre-K?: Multiple Stakeholders' Perspectives

Previous research on pre-kindergarten programs has shown some important indicators of quality, including developmentally appropriate practice and teacher-child interactions (Howes, 2008; Mashburn et al. 2008). These are based on researchers', or top-down, perspectives. Based on a model by Katz (1995), this study aimed to collect data from the other stakeholders. According to Katz, there are four main perspectives: top-down (researcher's perceptions); bottom up (children's perceptions); outside in (parent and policy maker's perceptions); and inside out (caregiver and facility director's perceptions).

This study used a focus group approach to collect data from the other stakeholders. Separate focus groups for each of the stakeholders were held, except for the directors and principal who were interviewed separately. There were seven focus groups: parents (1), children (2), Early Childhood Education students (1), teachers in pre-k programs (2), Early Childhood program faculty (1), and pre-k program directors/principals (3 interviews). The opinions presented in these focus groups were then qualitatively analyzed independently by two faculty members and two graduate students. They then met to discuss their different viewpoints of each transcript, collectively.

Preliminary analyses reveal emerging themes from the teachers are: pre-k should prepare children for kindergarten, quality teachers are important, developmentally appropriate practice, and funding are related to quality pre-k programs. Emerging themes from interviews with the directors are: good teachers, effective teaching strategies, developmentally appropriate practice, and outsiders understanding the importance of pre-k are related to quality pre-k programs. Data analysis is still in process, however, differences within groups and similarities within the groups is emerging. This research should provide policy makers information for improving programs and informing the public about the value of high quality pre-k programs.

Tiffany Dunsing and Dr. Jane Workman

School of Architecture - Fashion Design and Merchandising

Tasks of an assistant CAD patternmaker

The purpose of my project is to help make the CAD workbooks more understandable to students, draft slopers, problem-solve, and conduct my own research. During my research, I created a size 14 sloper using PDS2000, a program designed to create and manipulate pattern pieces. A sloper is the basic bodice, skirt, sleeve and pants. First, I measured a size 14 dress form. I then used the advanced CAD workbook to help draft the bodice front, bodice back, skirt front, and skirt back using PDS2000. I plotted the pattern pieces and constructed the bodice and skirt in muslin. Muslin is a woven cotton fabric used for first fittings. I noted adjustments needed to fit the size 14 dress form accurately. For example, the bodice needed to have fullness removed from the armseye. Then I made corrections to the pattern pieces and directions and plotted the pattern again. This process was repeated several times. When the bodice and skirt fit accurately, I drafted the sleeve to set into the armseye.

Mary K. Meadows

Department of English

For Our Soldiers: Those who risk their lives and give their lives for America every day

A large group of Americans, both young and old, serve or have served in a branch of the United States military. Many of that group have seen war and the before and after of war which they experience in different ways. The purpose of this project is to give a poetic voice to United States soldiers and showcase some of their experiences through poetry. In order to better understand soldiers as well as war, I interviewed veterans from Vietnam and World War II, a widow and mother of veterans, and a current soldier preparing for deployment. I read several books written by soldiers, several articles including letter home, and several blogs which serve as journals of soldiers in Iraq and Afghanistan. I also studied many collections of war poetry in order to get a better feel for the subject matter and form. I believe that, although I researched the topic and read the soldiers' experiences, my lack of experience hindered my ability to portray these topics in a truly accurate light. Some of the things I discovered that I wanted to come through in the poems that I composed for the project is the anxiety that is felt leading up to deployment, the horror experienced during war, the family side of war and those difficulties, and the rejection some soldiers experience when they return home. While I am confident in my poems as poems, with the knowledge that some of them still need a bit more revision, and even though I have learned a lot about the personal side of soldiers and war through my research, my ultimate conclusion is the best people to give a voice to soldiers are soldiers themselves. My collection of poems will be presented in a booklet, along with a list of books and articles that I studied for my project and from which I drew some of the information. The interviews will not be included for confidentiality sake.

Amy McReynolds

Department of Plant, Soil and Agricultural Systems

Germinating Native Plants in Green Roof Media

Green roofs, or gardens on the roof of a building, are becoming popular in our country as citizens begin to think more consciously about the environment. The purposes of a green roof include reduction of erosion and flooding, improving water quality, reducing heating and cooling by insulating the structure, to be aesthetically pleasing and to increase biodiversity in urban environments. SIUC installed the first regional green roof on a section of the agriculture building for demonstration and research opportunities. Historically, plants used on green roofs have predominately been sedum species. The only problem with these sedum species is that they are not native to Illinois or even North America. The ideal green roof would contain native plants that are adapted to a given area's climate which require much less maintenance than foreign plants. Even better would be plants that happen to grow well in the media that must be used on green roofs, since normal soil is much too dense and would collapse the roof. Typically, plants are sown in a regular soil and later transplanted to green roof media.

This research tested two native plants, *Anacyclus pyrethrum* and *Acmella oleracea*, on how well they germinate and how they perform in their early days growing in different media. The five media used were greenhouse media as a control, the green roof media that must be used on our green roof, green roof aggregate, greenhouse media with vermicompost, and green roof media with vermicompost. The results showed that *Acmella oleracea* performed best in greenhouse media with vermicompost and *Anacyclus pyrethrum* performed best in green roof media with vermicompost. This makes *Anacyclus pyrethrum* a very good candidate to be sown in and live in green roof on a green roof, as long as it gets a good start with plenty of compost.

Kirsten Eckstrum and Dr. Brent Bany

Department of Physiology

Expression and Localization of the Natriuretic Peptides and their Receptors in the Mouse Uterus during Implantation

Natriuretic peptides are a family of hormones most known for regulating kidney function and blood pressure. There are three natriuretic peptide genes called atrial natriuretic peptide (*Nppa*), B-type natriuretic peptide (*Nppb*), and C-type natriuretic peptide (*Nppc*). The receptors for these peptides are natriuretic peptide receptor-1 (*Npr1*), -2 (*Npr2*), and -3 (*Npr3*). Although a role for natriuretic peptides in the uterus is not well established, we recently published microarray data which indicated that all six of these genes are expressed in the uterus during embryo implantation. Since this is all that is known about the expression of these genes in the uterus, the purpose of this project was to characterize the expression of these genes in the mouse uterus during implantation. Steady-state mRNA levels and mRNA localization were assessed using quantitative RT-PCR and in situ hybridization, respectively. *Nppa* mRNA levels did not change much and expression was mainly localized to the circular muscle layer of the myometrium. *Nppb* mRNA levels increased dramatically in both implantation and inter-implantation sites after the onset of implantation and we are currently assessing localization of this expression. *Nppc* mRNA dramatically increased in implantation sites in the uterus immediately after the onset of implantation and this expression decreased as implantation proceeded. Notably, expression of this gene was transiently localized to the endometrial tissue immediately surrounding the implanting conceptus at the onset of implantation. *Npr1*, *Npr2* and *Npr3* mRNA were detected in all samples throughout implantation but did not change dramatically. Localization of their expression is currently in progress. These results show for the first time that natriuretic peptides and their receptors are expressed in the mouse uterus during implantation. This suggests previously undiscovered local paracrine/autocrine roles for natriuretic peptides in the uterus during the process of implantation and provides the basis for future research.

Kimberly F. Elsenbroek and Sara G. Baer

Department of Plant Biology

Development of Hands-On Learning Exercises in Ecology for Elementary School Children to Increase their Understanding and Appreciation for Nature

Natural resource protection depends on developing science education in ecology to ensure understanding, appreciation and protection of nature. Educating children about nature will be paramount to environmental protection. This is substantiated by development of education programs funded by the National Science Foundation that include The Schoolyard Long Term Ecological Research Program and the GK12 Education Program. An educational outreach project was conducted to enhance hands-on learning in ecology for first and second grade school children to increase their understanding and appreciation for nature. This project aimed to familiarize students with ecological topics including biodiversity, plant-animal interactions, productivity, leaf morphology, and decomposition. The hands-on learning activities included planting a prairie at Giant City School in Carbondale, IL and engaging students in ecology exercises outdoors and in the classroom. Lessons were developed to teach students: (1) how different habitats support different kinds of diversity; (2) the variety of organisms that perform decomposition, (3) positive, negative, and neutral relationships between plants and animals (through observation), (4) factors essential to plant growth through experimental deduction, and (5) the role of earthworms as decomposers and in soil mixing. First and second graders collected data, completed worksheets, and formulated conclusions about each exercise. More than half of the students were able to connect ecological concepts from one lesson to another other. In order to move forward in an environmentally sustainable way, a greater proportion of the human population must gain a better understanding of the environment to appreciate nature's limited resources and ecosystem services; hands-on learning activities may develop this understanding at the grade-school level.

Misty McElyea¹, David Gibson¹, Stephen Ebbs¹, Peter Filip²

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Potential Toxicity of Automotive Brake Dust on Plant Growth

Automotive brake dust (ABD) from brake pads is deposited on roadsides at an estimated rate of 3.26 kg/km year⁻¹. Friction products contain high concentrations of heavy metals including iron and copper. The metals from ABD may be deposited into environments which may accumulate to toxic levels and lead to restricted growth or mortality of wildlife. Despite these concerns, the potential absorption and effects of ABD on plants are unknown. As ABD comes into contact with water, the metals within the dust oxidize. In an early study, we found that after 23 days, the copper and iron concentration of a solution containing 25 mg L⁻¹ ABD exceeded US EPA water quality criteria for chronic toxicity to freshwater organisms. Subsequently, this solution was used to test effects of ABD on growth of turnip (*Brassica campestris*) and switchgrass (*Panicum virgatum*). Seeds were grown under three different treatments within petri dishes: watered with DI water, watered with DI water in the presence of ABD, and watered with an ABD solution (25 mg L⁻¹). Root length, number of lateral roots, and number of root bends were recorded every day. There was no difference between plants watered with DI water and those in which ABD was applied directly. The ABD solution enhanced root growth of both species (P <0.0001). The number of lateral roots produced following the dust treatment was enhanced in turnip (P=0.04), whereas in switchgrass, the ABD solution alone promoted lateral root formation (P=0.03). Both ABD solution (P=0.01) and dust (P=0.004) treatments promoted root bending in turnip, but not in switchgrass. Implications of these results suggest that ABD may alter plant growth. Copper and iron levels within the concentration treatment could be attributable to micronutrients and account for the root growth observed, whereas, in the other two treatments, micronutrients were not readily available.

Evan McCrea, Ryan Klopf, Sara G. Baer

Department of Plant Biology and Center for Ecology

The Effect of Dominance and Propagule Source on Root Biomass and ANPP in Restored Prairie across a Precipitation Gradient

Tallgrass prairie restoration is an important tool for returning functional ecosystems to the Midwest. The objective of this study was to determine whether grass seed population source (i.e., cultivar or locally collected) and restoration seed mix (dominance of grasses seeded) differentially affect aboveground net primary productivity (ANPP) and root biomass in prairie restoration. This study was conducted in previously established restoration experiments in Kansas and Illinois. Each restoration contained whole plots seeded to either cultivar or locally collected grass sources and each whole plot contained five subplot treatments of seeded grass dominance. All plots were also seeded with 13 forb species. In 2010, we removed two soil cores from the 20% and 97% seeded grass dominance subplot treatments. Roots were manually separated from cores, washed, dried (55°C), and weighed to determine root biomass. ANPP was measured by drying (55°C) plant biomass clipped from 0.1 m² frames. In Kansas, root biomass was greater in cultivar plots than non-cultivar plots ($P=0.002$), but similar in the 20 and 97% grass dominance treatments ($P=0.203$). In Illinois, root biomass was similar in cultivar and non-cultivar plots ($P=0.465$), but root biomass was greater in the 97% grass treatment than in the 20% grass dominance treatment ($P=0.070$). In Kansas and Illinois, ANPP was similar in both source and dominance treatments ($P>0.199$). Different responses of root biomass to the two factors (source and dominance) in the two locations may be due to variation in the effect of climate on abiotic filters in restoration. From 2005 to 2010, establishment and cover of dominant grasses was lower in Kansas non-cultivar plots, which likely explains the lower root biomass in non-cultivar plots in Kansas. In Illinois, the wetter climate likely enabled similar establishment of dominant species regardless of source, but resulted in greater root biomass in higher grass dominance treatments.

Michael A. Emery

Department of Psychology

Folic Acid Treatment does not result in Behavioral Sparing following Unilateral Controlled Cortical Impact in the Rat

Previous research by Iskandar et al. (2004) has shown that folic acid (vitamin B9) supplementation is effective in behavioral recovery and neural regeneration following spinal cord injury and optic nerve damage by promoting axonal regrowth. This study investigated the effectiveness of folic acid as a treatment following traumatic brain injury (TBI). Twenty seven adult male Sprague-Dawley rats received either a unilateral controlled cortical impact injury (CCI) over the sensorimotor area of the brain or sham surgery as a control. Those animals that received injuries then were treated with folic acid (80 µg/kg i.p. in saline) or saline (1 mL/kg i.p.) injections every 24 hours for 14 days. Behavioral deficits were evaluated on tasks of sensory ability, motor ability, and memory over a period of 22 days following injury using the bilateral tactile adhesive removal task, Rotor-Rod, reference memory paradigm of the Morris water maze and working memory paradigm of the Morris water maze. Following testing, brains were extracted and sliced on a microtome, then stained with cresyl-violet. The volumes of the lesions were compared between the three groups to examine whether folic acid treatment decreased the severity of injury. Strong injury effects were observed on all behavioral tasks, indicating that the injury location produced the significant deficits. However, no treatment effect was seen on any behavioral task or any reductions in lesion size. It can be concluded that folic acid treatment at the current dose is ineffective for treating unilateral CCI over the sensorimotor area despite its efficacy in recovery following spinal cord injury. An additional treatment group is being examined with a ten-fold increase in dose to determine if there are any dose-response effects.

Yuri Fedorovich

Department of Physiology

Activated Caspase-3, Substance P and CGRP Expression in Embryonic Chick DRG Neurons after Pyridoxine Administration

A complete understanding of how sensory feedback modulates spinal motor circuitry would be greatly advanced by a method to alter specific sensory modalities. Large doses of pyridoxine have been known for many years to cause large fiber deafferentation in adult mammals. Unfortunately, the mechanism of this toxicity is not understood and the specificity of the resulting lesion is a matter of some debate. The best clue for a mechanism of action comes from the finding that co-administration of NT-3 prevents the loss of sensory neurons (Helgren et al., 1997). This suggests that pyridoxine targets trkC positive neurons or that NT-3 acts as a general neuro-protectant in this situation. Despite a clear understanding of the mechanism behind pyridoxine toxicity, numerous people have used pyridoxine deafferentation as a means to study sensory modulation of motility in adult mammals and have interpreted their results in the context that pyridoxine causes a loss of proprioceptive feedback (e.g. Pearson et al., 2004). Previously, we have shown that administration of pyridoxine to chick embryos kills trkC positive DRG neurons and alters both embryonic and post-hatch leg movements (Sharp and Bekoff, 2003). Our findings are consistent with pyridoxine toxicity resulting in a neuropathy predominated by a loss of proprioception. In the current work, we present immunohistochemical data addressing the mechanism and specificity of pyridoxine toxicity. We hypothesized that pyridoxine acts by disruption of a critical physiological pathway specific to trkC positive neurons and should therefore cause an increase in apoptosis over that normally occurring during embryogenesis. Additionally, neurons requiring NGF (e.g. pain and thermal sensitive neurons that express substance P and CGRP) should not be affected by pyridoxine treatment.

Zachary Loconsole, Chad Briggs & Kathie Lorentz

Department of Psychology & University Housing

The Influence of Living Learning Communities on Retention and Graduation Rates at Southern Illinois University Carbondale (SIUC)

One of the most pressing issues for SIUC in recent years has been the institution's relatively low retention rates. For example, first-to-second year retention rates have hovered around 70% for the last decade, indicating that one-in-three incoming students are leaving the university before their second year. Furthermore, the first-to-second year retention rate has steadily decreased from a high of 71.8% in 2001 to a low of 67.8% in 2008. From a monetary standpoint, the loss of just one student costs the university about \$22,500 per year (Swenson, 2011), which, for the 2008 cohort, translates to a loss of approximately 18.5 million dollars for the second year alone.

Accordingly, SIUC has implemented a number of programs to help improve retention. The Learning Living Community (LLC) program, first implemented by University Housing in 2001, is one such program, and is designed to integrate first-year students into social and academic networks where they can quickly make friends, find study partners and readily gain a sense of belong at SIUC. The efficacy of the program to achieve these aims has been investigated (Briggs, et al., 2010), but the impact of the program on retention and graduation rates has not. This study fills that void by comparing retention and graduation rates for the 2001-2007 LLC and non-LLC cohorts.

The results generally suggest the LLC program is effective at retaining students. With a couple of exceptions, including the program's pilot cohort (2001), the gap in retention between LLC and non-LLC students tended to grow larger for each successive cohort, suggesting that the program is becoming more effective over time. This trend did not hold for graduation rates, however. These results will be discussed within the larger context of the program, and with regard to the monetary value brought to the university.

Mallory Lindberg, Alison Hantak, Mandy King, Dr. Laura Murphy

Department of Physiology

The effects of ginseng and Doxorubicin on human breast cancer cell proliferation and vascularization in tumors from xenografted nude mice

American Ginseng, a commonly used medicinal herb, has been shown to have useful anticancer properties. This study aims to find whether whole ginseng root extract (GE), alone or in combination with doxorubicin (Dox), an anthracycline antibiotic used as a cancer chemotherapy drug, alters tumor cell proliferation and vascularization in immunocompromised nude mice inoculated with human MDA-MB 231 breast cancer cells. In this study, there were four separate treatment groups ($n \geq 4$ mice per treatment group); Control/Saline, Control/Dox, GE/Saline and GE/Dox. The control groups received normal drinking water and were injected intraperitoneally (once a week for 2 weeks) with either physiological saline or Dox (0.125mg/25g BW). The GE treatment groups were given 1% powdered GE dissolved in drinking water and they were injected with either saline or Dox. Final tumor volumes and weights were measured upon sacrifice. Tumors were fixed in 10% formalin and embedded in paraffin. Immunohistochemistry (IHC) was performed on tissue sections that were probed for KI-67, a marker for proliferation, and CD-31, a marker for vascularization, and then counterstained with DAPI, a nuclear stain, prior to analysis using fluorescent microscopy. As hypothesized, the tumors from the untreated control group were larger in volume and weight than the groups receiving GE, Dox, or both. Treatment with either GE or Dox significantly decreased tumor volume ($p < 0.05$). Concomitant treatment with GE/Dox did not further suppress tumor growth compared to Dox or GE alone. However, IHC showed that GE/Dox treated tumors exhibited a greater vascularization and decreased proliferation compared to the other three treatment groups. Together, these results suggest that whereas GE treatment alone appears to decrease proliferation of tumor cells, that when used in conjunction with Dox, GE may be able to enhance the bioavailability of Dox to tumor tissue.

Christin Fotis, Dan Nickrent, Matt Geisler

Department of Plant Biology

*A First Look at Genes in the Parasitic Plant *Pilostyles thuberi**

Not all plants are autotrophs, relying on sunlight for their daily energy. Some plants have learned to live off of the labors of other plants, these are called parasitic plants. Through comparison of the genes of the parasitic plant *Pilostyles thuberi* and its plant host to their genetically related autotrophic cousins, I am examining the rate of gene evolution. This will help us come to understand how an organism can change from an autotrophic organism to a heterotrophic parasite. The main question I have set out to answer is “do all genes mutate at the same rate?”, and if not, what are the genes that are the most altered in the parasite, and are any genes lost altogether? Do any new genes appear in the parasite or the plant host? In order to do this analysis, I first needed some samples of host and parasite. I went out into the field with Dr. Geisler and Nickrent to Benjamin, Texas and sought out the plants in their natural habitat. I took many field samples of male and female parasitic plants that were just opening up their flower, several unopened flower buds, and stem and leaf tissue from infected and uninfected host plants. These were brought back to SIUC and frozen in liquid nitrogen and stored at -80C. RNA was extracted from each sample type (flower buds of male and females, infected and uninfected host stems), and stored at -80C. First strand cDNA synthesis was made using Impromp II reverse transcriptase and oligo-dT primers. The cDNA was then tested using PCR with gene specific conserved primers to the polyubiquitin 10 (UBQ10) gene. A second strand was synthesized using a small quantity of RNase H to slowly digest the RNA side of the first strand cDNA hybrid molecule, and DNA polymerase was added at the same time to fill in the gaps left by RNase H. cDNA libraries were ligated to the pGEM easy vector, and transformed to *E. coli* bacteria. I have thus obtained a copy of the expressed genes of both the host plant and the parasite. These genes are then sent off for sequencing, so far we have identified 51 *Pilostyles* genes and are working on getting many more. When these genes are compared with related plants such as tomato and Arabidopsis, we will see what has changed in the parasitic plant, and gain insight to their evolution.

Diamond Garner

School of Accountancy

Determinant of Paid Tax Preparer Usage

This study addresses the use of paid tax preparers by looking at multiple tax return and demographic variables. These variables include: average adjusted gross income (AGI), Schedule C's, earned income tax credit (EITC), number of tax refunds, population, taxpayer age 65 or older, and household size. It is important to investigate the use of paid preparers because beginning in 2011 paid preparers must have certifications by the IRS to file income tax returns for other taxpayers. The study utilizes 2007 tax data on Illinois taxpayers provided by Internal Revenue Service (IRS) in addition to U.S. census data provided by the U.S. Census Bureau. The procedures include using SPSS and running a linear regression analysis. This will analyze relationships between the use of paid tax preparers and the variables of interest. This study found paid preparer usage has a positive relationship with average adjusted gross income (AGI), Schedule C's, earned income tax credit (EITC), number of tax refunds, population, taxpayer age 65 or older, and household size.

Duane Lickteig

Department of Microbiology

Efficacy of X8879 Salmonella typhimurium in surviving the acidic environment of the stomach

When creating a vaccine for a pathogen, the attenuated vaccine strain is always compared to the wild-type strain in regards to how well it is able to survive the body's harsh environments, to spread and induce an immune response. We conducted this work in order to test the ability of the *S. typhimurium* vaccine strain X8879 to survive the very acidic environment of the stomach and attempt to find an optimal immunization protocol that would result in a pH change that would better support survival and proliferation of the vaccine strain. Nine mice were used in the study and assigned to one of the 3 groups: a control group (no treatment); treatment with sodium bicarbonate ten min prior to oral inoculation; and a group that was fasted four hours prior to oral inoculation. The X8879 was grown to an OD of 0.95 and 1×10^9 CFU were inoculated into each mouse. The mice were euthanized 30 minutes post-infection and their stomachs were excised using sterile technique. Stomachs were then transferred into test tubes, homogenized and dilutions of homogenate were plated. The remainder of the stomach tissue homogenate was tested for the pH. Stomachs of the bicarbonate-treated and fasted mice had identical pH values (pH 6-7), while stomachs of the control group have a lower pH (pH 4). Our results indicate that the most optimal treatment is the fasting of mice prior to immunization for 3-4 hours, as under these conditions more *S. typhimurium* vaccine strain cells survived.

Ryan Lichtenstein

Department of Radio-Television

Robbie the Space Raccoon

The purpose of “Robbie the Space Raccoon” was to produce a quality half-hour children’s television pilot. The show centers on the adventures of Robbie, a six year-old raccoon girl that lives in space because of the CASA space animal program. She tested well in her preschool and now travels the universe in her spaceship powered by imagination with her human and robot crew. The crew consists of Captain Bosco, the ship’s by the book leader, Doctor Sarah Doctor, who is the ship’s physician, Roy the Space Cowboy, the ship’s cook and resident cattle rancher, and Loki, the ship’s mischievous robot mechanic named for the Norse god with the same qualities. Together, the crew travels from planet to planet learning important life lessons about eating a healthy diet, sharing, and friendship. The show itself incorporates many visual elements including a digital set created by the students of the Computer Arts and Technology Society or CATS. The project is currently in a fine cut form but will be completed by May 1st. A screening will take place the week of May 7th to show the work.

Stephanie Geiser and Dr. Brian Lee

Department of Chemistry and Biochemistry

The K Homology Domain of Conserved Virulence Factor A

Streptococcus is a bacterial pathogen, found in humans, known to cause scarlet fever and strep throat, among other infections. Normally in bacteria, guanosine tetraphosphate (ppGpp) increases during times of nutrient starvation, through a stringent-response that is controlled by RelA and SpoT. This reaction causes a slow-down in protein and DNA synthesis, while simultaneously creating an increase in proteolysis and amino acid biosynthesis. An alternate pathway to regulate virulence, that utilizes conserved virulence factor A (CvfA), was recently discovered in streptococcus eliminating the need for a stringent response in these bacteria. The CvfA protein actively controls virulence in streptococcus using post-transcriptional regulation. CvfA contains three distinct regions: a transmembrane helix (TM), a hnRNP K homology (KH) domain, and a histidine-aspartate (HD) hydrolase domain, though the structure of CvfA remains unknown. The CvfA protein presumably targets specific mRNA sequences and has endonuclease activity. A KH domain will bind RNA through a cleft formed between the GXXG motif, and the variable loop between the second and third beta strands. Our studies are focused on the structure of the KH domain in complex with its RNA binding target in order to understand the determinants of molecular recognition. Recently CvfA from nucleotides 652-891 and 613-891 was successfully cloned using maltose binding protein (MBP) fusion vectors pMal-c5-TEV and pMal-c5-3C. Using an MBP fusion vector, we can express our target protein and purify both using amylose affinity chromatography. The protein is then cleaved from the vector using a protease (pMal-c5-TEV contains a protease site for tobacco etch virus protease at the amino acid sequence Glu-X-X-Tyr-X-Gln/Ser with cleavage at the Gln/Ser site, while pMal-c5-3C contains a protease site for human papillomavirus 3C protease at Leu-Glu-Val-Leu-Phe-Gln-Gly-Pro with cleavage after the Gly site). The purified CvfA KH domain sample will allow us to further proceed with the structural determination of CvfA using NMR, and explore its interactions with mRNA.

Lana Gosnell

Department of History

Cairo: Then and Now

This project was designed to highlight Cairo during the turn of the century, specifically focusing on its downtown area. Cairo was a growing and prominent city in southern Illinois at the turn of the twentieth century. Its geographic location at the confluence of the Ohio and Mississippi rivers, as well as being linked to Chicago by the Illinois Central Railroad Company, offered seemingly limitless opportunity for industrial and commercial growth. For numerous reasons, the potential for growth would be unrealized. During the twenty-first century, Cairo suffered a dramatic decrease in private and commercial realty. As a result of economic hardships, merchants and proprietors closed shops and abandoned businesses. In turn, citizens of Cairo left their homes in search of prosperity elsewhere. Today, Cairo is a shadow of its former existence.

The purpose of this project is to preserve the history of Cairo's commercial district and visually document the commercial district's current condition before further deterioration or demolition occur. By comparing and contrasting the apex of Cairo's industrial and mercantile achievements to its current state, the effects of social and economic erosion are evidenced. Providing a visual illustration of this comparison will intensify the public's understanding of the importance of historical preservation in this geographic locale. This website will also aid future scholars and historians in conducting research of Cairo, Illinois.

Viewers of this website should be aware that this project is a work in progress. The information presented was gathered from a limited number of resources and therefore may contain some erroneous or incomplete data. If a viewer has information they wish to contribute, they are strongly encouraged to do so. Research will continue to be conducted by project developers and future Preservation Summer students. The website will be updated as new discoveries are made.

Erga Lemish and Dr. Matthew Schlesinger

Department of Psychology

Gender Differences in Object Location Memory

Many everyday activities, such as searching for a product in a store, involve visually scanning a wide array of objects (e.g., boxes in the cereal aisle) and selecting a specific item. An important aspect of this selection behavior is noting the locations of objects in these scenes, and remembering them during the selection process. In laboratory investigations of this behavior, a pervasive finding is that females outperform males on tasks that measure their ability to remember the locations of objects in a visual scene (i.e., object-location memory). In contrast, females and males typically perform equally well on tasks that measure their ability to recognize new or unfamiliar objects (i.e., object-identity memory). The goal of the current experiment was to study the influence of gender on both forms of object memory, under conditions in which the scanning process could be systematically observed and measured. Accordingly, 54 participants (27 females, 27 males) were asked to first scan a 12-object display, arranged on a computer screen in a 4x3 grid. After briefly studying each 12-object display, participants viewed a modified display, including two objects that had been moved to new locations, and two completely new objects. As expected, participants were more successful at identifying new versus moved objects. In addition, females and males were equally successful at identifying new objects. Unexpectedly, females and males did not differ in their ability to identify moved objects. We are exploring this third finding further by comparing the specific scanning strategies that females and males used as they studied the 12-object display.

Lehman, B.A.¹, Ferré, E.C.¹, Geissman, J.W.², Maes, S.M.³ and Marsh, J.S.⁴

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Magma dynamics above a mantle plume: Example from the Karoo Large Igneous Province, South Africa

Mantle plumes produce voluminous amounts of magma (10^6 km^3) during a short period of time (10^6 years). The heat input of such plumes into sedimentary basins has been proposed as a significant factor in several global climatic crises. Indeed, heat transfer through conductive and advective processes is likely to bake organic matter-rich sediments, which in turn may release greenhouse gases (CO_2 and CH_4). One of the yet poorly understood aspects of this model is the regional pattern of magma flow. The objective of this study is to constrain magma dynamics in the Karoo Large Igneous Province (LIP) intruded in a continental basin of South Africa.

Magnetic fabrics provide an efficient and accurate mean to determine magma flow direction in gabbroic rocks. The anisotropy of magnetic susceptibility (AMS) is particularly suited for this type of study. A previous study had shown that the AMS fabric is a reliable proxy for magma flow as long as samples are collected from the upper chilled margin of a sill. The central part is more complex due to interference caused by thermal convection.

Oriented core samples were collected from 30 different sills and yielded 1598 specimens for AMS measurements. The low-field magnetic susceptibility K_m ranges widely from about 100 to 20,000 $\cdot 10^{-6}$ [SI], while the degree of anisotropy P' ranges from 1.01 to 1.10. Thermomagnetic experiments reveal that the main magnetic carrier is titanomagnetite with variable ulvöspinel content. This is confirmed by measurement of hysteresis properties that also indicate that titanomagnetite in general has a pseudo-single domain grain size.

The results of this study clearly indicate that magma flow followed a main NW-SE direction in the studied area. The AMS directional data is consistent with the nearly horizontal attitude of the sill in 23 out of 30 cases, with subvertical K_3 axes. In 5 out of 30 sills, K_3 axes are subhorizontal, characterized by scattered directional data and are considered anomalous AMS fabrics. K_1 axes are systematically subhorizontal and mark the magma flow direction. This regional scale flow pattern indicates that the Karoo plume head was not located under the Drakensberg basalts, the thickest part of the Karoo volcanic pile. Instead, the plume head might have been located to the NW of the Karoo Basin, in Namibia. Overall, these results show that magnetic fabrics are an efficient tool to analyze large-scale magma dynamics.

Aubry Greenberg

Department of Psychology

Effects of Abuse History on the Credibility of Women that Raise Sexual Harassment Claims

Recent research finds that women who have experienced sexual abuse in their past are at higher risk for sexual harassment than others, which prompts concerns about how women with abuse histories will be treated if they raise a complaint of sexual harassment. The current study examined the credibility of women with a history of sexual abuse compared to women without a history of sexual abuse on complaints of sexual harassment. College students ($n=202$) judged the credibility of a female employee's complaint of sexual harassment by her boss and coworkers by reading a scenario based on a real case. The scenario was manipulated such that half the participants were told that the complaining employee had a history of child sexual abuse and recent partner abuse, whereas the other half was not given this information. The remainder of the case described actions that could be construed as possible quid pro quo and hostile work environment sexual harassment. All participants rated sexual harassment on a Likert Scale ranging from 1- Definitely No (no sexual harassment occurred) to 6 – Definitely Yes (sexual harassment occurred). In addition, participants completed the Ambivalent Sexism Inventory (Glick & Fiske, 1997), which measures hostile and benevolent sexism. Results are expected to show that women and those with low scores on hostile sexism will find the complaint of sexual harassment to be more credible than will men and those with high scores on hostile sexism. However, whether complainants with a history of sexual abuse will be more or less credible than complainants without an abuse history is an exploratory question.

John Hamburg, Tod Policadriotes and Ron Mays

Department of Mechanical Engineering and Energy Processes

Performance Analysis of Carbon-Carbon Aircraft Brake Composites Impregnated with Nano-Particles

The addition of nano-particles in composites has greatly advanced the development of new materials. Nanomaterials are capable of altering both a material's mechanical properties and performance by filling the open porosity in the composite, creating a more stable structure as well as increasing or stabilizing the coefficient of friction. Due to production demand, nano-additives are becoming more affordable, and thus more practical for a variety of applications, particularly in the brake industry. However, in respect to carbon-carbon (C/C) composites for aerospace braking applications, very little research has been performed on the addition of nano-particles. This research project set out to determine the effect of nano-particles on the performance of a commercial aircraft C/C composite brake. Seven pairs of 2.75 inch diameter disks were removed from a single commercial sample of 2-D C/C provided by Honeywell. One pair was used as a baseline in comparison to the remaining six. Two pairs of the remaining six were used for each type of nano-particle with each pair containing two different solution concentrations. Nano-particles were combined with Isopropyl alcohol in concentrations of 0.024 g/ml and 0.048 g/ml. The disks were then placed in the nano-material solution and sonicated for 270 minutes, followed by drying in an oven for 24 hours at 100 C. The three types of nano-particles used were Silicon, Silicon Carbide and single walled carbon nano-tubes (SWCNT). Testing will be performed on a LINK ring-on-ring subscale aircraft brake dynamometer, simulating an aircraft taxiing to the runway, landing, and taxiing back to the terminal. This process will be repeated 50 times simulating all conditions with those of a Boeing 747. Polarized light and SEM/EDS Microscopy will be used to inspect each brake. The data produced from this testing will assist in the design of more efficient aerospace braking systems, benefiting the primary concern of public safety.

Steven Kocher, Brandon Vieth, William Sedig, Shai Yeshayahu

School of Architecture

Grasshopper, Rhinoceros, Arduino: Physical Exploration of Digital Protocol

Architecture and the way we inhabit space is changing. Applied technology can free architecture from stationary form and space and grant the capacity to react, interact, and alter its form and the space around it. This project is an attempt to develop a system exploring the interface between a physical, interactive system and digital modeling software.

During the first phase of our research, we established connection between three-dimensional modeling software (Rhinoceros and Grasshopper) and the Arduino microcontroller through the "Firefly" application. The established protocol allows one Arduino to process sensory data and wirelessly transmit it to the modeling software, which reformats and exports the data to a second Arduino controlling a physical system.

The second phase of the project is currently in progress: we are using the hardware/software interface developed during the first phase to operate a full scale privacy wall. The wall will maintain an open state (allowing those behind it to see out) until infrared proximity sensors detect an approaching person or object, at which point the wall will begin to close as the detected person or object moves closer to the wall. A remote carbon dioxide sensor will be used to establish the relative human occupation of the area around the wall; this data will be used to further inform the wall's operation.

The system is designed to allow human/architecture interaction on a personal scale, using the platform of privacy to establish a clear relationship between human action and physical system reaction.

Elissia Kimball, Chris Barth, & Bob Swenson

School of Architecture

Steamboats Built at Metropolis on the Crescent of the Lower Ohio River

Our objective in this project was to thoroughly research the steamboats that were built in Metropolis, Illinois during the 1800s. We joined Professor Bob Swenson in his pursuit to scour countless books and archives to find information relevant to the 63 steamboats that he identified as being built in Metropolis. His goal is to provide descriptions for Steamboat photographs that he has collected since 1985.

Professor Swenson has used the Steamboat Directory by Frederick Way as his main source for information about the Metropolis built steamboats. In addition to this, he uses interviews, newspaper articles, historical documents, internet sources, and books to accurately describe these Steamboats. One example of his research method was his trip to Metropolis Historical Society to locate pictures and details about photographs that were kept in the attic. He has also asked students like me to transcribe handwritten historical documents by authors such as Robert Allyn who wrote about life on the Ohio River during the 1800s. His perseverance has enabled him to uncover some truly valuable information about the Metropolis Built Steamboats.

This research is being used to create his book, *Steamboats Built at the Metropolis on the Crescent of the Lower Ohio River*. Swenson hopes to have this book ready for the 2011 Bicentennial celebrating the first steamboat on the Western waters traveling from Pittsburgh to New Orleans. The contents of the book will be used for exhibitions, presentations, and other events corresponding to the Bicentennial Celebration.

Andrea R. Hartmann, Yuping Ding, Michael J. Lydy

Fisheries and Illinois Aquaculture Center, Department of Zoology

Miniaturized matrix solid phase dispersion extraction for the analysis of pesticides in Chironomus dilutus using gas chromatography electron capture detection

A miniaturized method using disposable glass Pasteur pipettes (5.75") was developed based on matrix solid phase dispersion extraction to measure seven pesticides or their degradation products in the aquatic invertebrate, *Chironomus dilutus*. The target pesticides included the organochlorine pesticide dichlorodiphenyltrichloroethane (*p,p'*-DDT), and its major degradation products, dichlorodiphenyldichloroethane (*p,p'*-DDD) and dichlorodiphenyldichloroethylene (*p,p'*-DDE); pyrethroid insecticides, permethrin, bifenthrin, and tefluthrin; and organophosphate pesticide, chlorpyrifos. The method compared Florisil and silica gel as dispersants for extraction and cleanup of biological samples. Analyses were performed by gas chromatography with micro-electron capture detection (GC- μ ECD) with 4, 4'-dibromooctafluorobiphenyl and decachlorobiphenyl as spike surrogates. Silica gel (0.5g) was selected as the dispersed absorbent to blend with midge larvae (0.05g wet weight) and anhydrous sodium sulfate, while 4 ml ethyl acetate was used as the elution solvent. Mean recoveries ranged from 57.2 to 127.6% at spiked levels between 20 and 1000 $\mu\text{g kg}^{-1}$, with relative standard deviations below 15% for most target analytes. The method detection limits ranged from 3.1 $\mu\text{g kg}^{-1}$ for *p,p'*-DDD to 30.1 $\mu\text{g kg}^{-1}$ for permethrin. The proposed method was used to measure *C. dilutus* residue of tefluthrin, chlorpyrifos, and *p,p'*-DDD in laboratory-exposed toxicity tests. The developed method was easier and less time consuming than the conventional extraction procedure and reduced the amount of sample, dispersant and solvent used.

Dustan Heidel, Austin Robertson and Harvey Henson

Department of Geology

On Shaky Ground: Assessing Middle School Students' Earthquake Knowledge and Preparedness

In the past 200 hundred years, the central United States has been the source of several major earthquakes originating in the New Madrid fault zone in Southeastern Missouri. Although there has not been a major earthquake in the region for over 100 years, scientists believe that the threat of another earthquake coming from the New Madrid fault zone exists. This threat is why the Illinois Emergency Management Agency/ Federal Emergency Management Agency has funded the earthquake awareness program “Suddenly on an Average Day” to inform elementary children in the Southern Illinois region about the proper safety procedures to take during an earthquake. The awareness program involves a student from Southern Illinois University traveling to a school and then giving a brief presentation about earthquake geology, earthquakes in the Midwest region, and safety procedures for an earthquake. The students then take a survey containing several questions about each topic covered in the presentation. After the surveys are taken, they were recorded and a T-test and ANOVA test were used to see if there was any improvement in scores of students that viewed the presentation and students that did not see the presentation. These students that did not receive the presentation were used as a control group and after the completion of the experiment were shown the presentation. After reviewing the completed surveys, the results show an increase in scores for the students that received the presentation as opposed to the control group that did not. Results from the study have also helped improve the questionnaire and the intervention.

Karla Keller Avelar

Department of Criminology and Criminal Justice

Applying Broken Windows Theory to Carbondale Communities

The goal of this project was to test the Broken Windows Theory in Carbondale communities. Broken Windows Theory (BWT) states that the presence of disorder influences people's perceptions about the area. When there is more disorder, people view the area as “uncontrolled” and become fearful; they withdraw from enforcing social norms, which breaks down the collective efficacy of that community. This increases crime in the area. Using an experimental design, this project attempted to examine the relationship between disorder and fear of crime in three treatment and three control areas of Carbondale. Areas were selected because of high reported crime and presence of disorder. This study examined how perceptions of crime, fear, and willingness to remove trash/debris changed over a five month period when subjects were exposed to volunteer workers removing signs of disorder. Twice weekly for eight weeks, volunteers picked up garbage in each treatment area. This study used a pre-test/post-test survey design and systematic observation of disorder to collect original data. Systematic social observation demonstrated the integrity of the intervention. The treatment areas saw reductions in disorder during the treatment and control areas did not. Survey data will be used to answer the following questions: Is there a relationship between disorder and the fear of crime? Did the visibility of volunteer workers removing signs of disorder affect individuals' perceptions of fear of crime? Did seeing less disorder relate to individuals' perceptions of the fear of crime?

Tamara Kang & Daryl Kroner

Department of Criminology and Criminal Justice

Subthreshold Depression and Suicidality in Women Offenders

The DSM-IV-TR ignores subthreshold offenders which can leave them untreated. This can lead to chronic mental illness and heightened health care costs. Subthreshold level and diagnosed offenders were compared dimensionally using the Depression Hopelessness Scale, Becks Hopelessness Scale, and the Becks Depression Inventory 2nd edition self-report measures. It was hypothesized that there is no difference between subthreshold and diagnosed offenders' self-report scores. Consequently, the DHS and BDI-II scores for subthreshold offenders should predict suicide attempts equally as well as the diagnosed group. Participants were 92 female offenders from two correctional institutions in Canada. The results found a significant difference between the means of BDI-II, the DHS-Dep, DHS-Hopl between the subthreshold group and the control group. There is no significant difference between those women offenders diagnosed with major depression and those with subthreshold level symptoms which gives evidence that these groups suffer from similar rates of depression when measured by self reports. When predicting suicide attempts among the three groups, the AUC results favored both the BDI-II (AUC = .736) and the DHS-dep (AUC = .677) in predicting a previous suicide attempt. This study expresses the need for subthreshold offenders to receive mental health treatment before targeting their criminality in treatment. When using self reports, you can predict all offenders that suffer from suicide attempts and focus on suicide prevention among female offenders. Additionally, when using dimensional measures instead of categorical we can detect those subthreshold offenders in need of interventions for mental health services and match their treatment intensity to the levels of self reported depression. Subthreshold offenders are typically ignored by categorical diagnoses, but are impaired by significant distress and experience negative consequences.

Adam Herwig and Dr. Kim Harris

Department of Agribusiness Economics

Financial Analysis of a Farm Business

The student will use standards established by the Farm Financial Standards Council (FFSC) to conduct a financial analysis of a farm business. Farm accounting data will be used to construct three financial analysis of a farm business. Farm Accounting data will be used to construct three financial statements: a balance sheet, income statement, and statement of owner equity. Once financial statements have been constructed, the financial health of the business will be evaluated using four criteria: liquidity, solvency, profitability and financial efficiency. Sixteen ratios recommended by the FFSC will be calculated and used to assess the key measures of financial health and identify and unusual characteristics. And by comparing the farm business's important ratios with industry standards derived from the financial statements of farms of similar size in the same line of activity (comparative analysis), e.g., crops, the students will be able to determine the farm business's comparative strengths and weaknesses, the key factors which determine its competitive position within industry. Analysis on the four criteria will provide the student with the necessary information to comment on the strengths and weaknesses of the farm operation and in the case of weaknesses make suggestions for adjustments that will lead to improved performance. This project should increase the student's ability to identify and solve financial management problems by applying appropriate methods of analysis and problem solving techniques, as well as improve the student's ability to select the relevant tools for analysis and decision-making and learn to ask the right questions and think critically.

Megan Huebner and Dr. Matthew Schlesinger

Department of Psychology

The effect of aperture size on perception of occluded motion

In the everyday environment, we often reach or move toward objects without looking directly at them. These movements are “memory-guided” because they rely on stored visual information, rather than moment-to-moment visual feedback during the action. A consistent finding from our lab is that when movements are guided by memory, they are less accurate than those guided by vision. The current investigation asked whether memory-guided movements become more accurate as visibility of the target is gradually increased. In order to investigate this question, participants tracked a moving object on a computer screen under five different vision conditions, which varied the visibility of the target from hidden to completely visible. One vision condition had total visibility. In three of the five vision conditions, the target was partially visible through holes in the occlusion screen. The last vision condition had complete occlusion; the object could not be seen as it moved across the screen. As expected, increasing the visibility resulted in an increase of the tracking performance. Therefore, visual information about a moving object is important in order for it to be accurately tracked.

Jordan Kabat, Dr. Kanchan Mondal

Department of Mechanical Engineering and Energy Processes

Analytical Study of Parameters for Scale-Up Fabrication of Carbon Nanotubes

Carbon nanotubes are vital in the continued development of technology, benefitting specifically biomedical, electronic, and infrastructural industry. With great electrical conductivity properties, as well as a very high strength-volume ratio, they are considered to be the material of the future. The problem that has arisen with carbon nanotubes is that they are expensive due to the slow process to create them. The current fabrication techniques produce a very small quantity under very restricted, ideal conditions. As the demand for carbon nanotubes increases, the current fabrication technique will not be sufficient.

The purpose of this research project is to analyze and improve the techniques currently in use for the manufacturing fabrication process of nanotechnology. There are many parameters required in the process, ranging from temperature, types of gases used, flowrate of gases, and surface of the substrate. This project began with the goals of analyzing each of these in turn, and finding the most efficient combination of these. These results could then be formed into a high scale industrial model.

As is sometimes the case with research, progress has not happened like I had hoped. Due to problems with the chemical vapor deposition machine I use for the process, I still have not been able to gather any results. When the machine is running effectively again, I expect to find that there are multiple combinations of parameters that create quality nanotubes, but a certain set will stand out as the most efficient. This will be quantitatively determined using a tunneling electron microscope to analyze nanotube length, width, and quantity.

Kristen Jordan

Department of Zoology

The Effects of Sublethal Temperatures and Food Availability on Tigriopus

The objective of this research was to investigate the potential effects of global warming on the marine copepod, *Tigriopus californicus*. Because this zooplankton is a pelagic species that lives in the upper water column, it may be more susceptible to increases in temperature. Additionally, increases in the temperature may alter the availability and/or nutritional value of its primary food source, algae. In this experiment, 20 adult individuals in each test beaker were held at a constant temperature of 20, 22, or 24 degrees Celsius. Within each temperature classification, copepods were subjected to low, medium, and high food availability for a total of 9 experimental treatments, which were all replicated three times for a total of 27 beakers. My hypothesis was supported that increased temperature promotes sedentary behavior. Treatment effects were most apparent at 24 degrees Celsius. Unexpectedly, minor thermal stress augmented reproductive rate. While trends in food availability suggested that it affects behavior, my hypothesis that food limitation would compound the effect of temperature on behavior was not supported by statistically significant differences. It appears that copepod excretions promoted algal growth between feedings, and thus, removed food availability as a limiting factor. Results suggest that regardless of food availability, global warming will speed reproduction and impair swimming performance. These behavioral and reproductive changes may make *T. californicus* more susceptible as prey, and for a short time, delight their predators.

Kelsey E. Jarrett¹, Caitlin C. Moliske², Michael W. Collard², and Jodi I. Huggenvik²

¹Department of Microbiology and ²Department of Physiology

Deaf1 Increases p53 Levels in Transiently Transfected Kidney Cells

Deformed Epidermal Autoregulatory Factor-1 (DEAF1) is a transcription factor that has been linked to depression, suicide, diabetes, and cancer. DEAF1 interacts with DNA protein kinase, a protein that helps regulate DNA repair, apoptosis, and the cell cycle. Preliminary data in the Huggenvik/Collard laboratories indicated that DEAF1 interacts with p53. p53 is a transcription factor that regulates cell growth, repair, and death. The p53 gene is mutated in greater than 50% of all cancers. The goal of this project was to determine if p53 and DEAF1 interact, and if they do, what types of interactions occur. To investigate this, human embryonic kidney cells (HEK) were transfected with expression vectors for p53, DEAF1, or both p53 and DEAF1 and protein extracts were prepared from cell lysates. Immunoprecipitations and Western Blot analyses were performed to look for protein-protein interactions. Although we were unable to confirm the interactions of the two proteins by immunoprecipitation, Western blot analysis showed p53 levels were increased in cells co-transfected with DEAF1. This suggests that DEAF1 may stabilize p53 levels by an indirect mechanism.

Jake Jasurda, David B. Schwartz, Deborah O. Jung, and Buffy S. Ellsworth

Department of Physiology

The forkhead transcription factor, FOXP3, is required for normal spermatogenesis

The hypothalamic-pituitary-gonadal (HPG) axis plays a fundamental role in the normal development and function of the reproductive system. This pathway begins with the release of gonadotropin-releasing hormone (GnRH) in systematic pulses by the hypothalamus. GnRH is then bound by receptors found on gonadotropes in the anterior pituitary gland. The gonadotroph cells synthesize luteinizing hormone (LH) and follicle stimulating hormone (FSH), which are then secreted into the bloodstream. The gonads, once stimulated by these glycoprotein hormones, begin gametogenesis and the synthesis of sex hormones. Mice with a mutation in the forkhead transcription factor gene *Foxp3* are infertile. In humans, mutations of *FOXP3* lead to an autoimmune disorder known as immunodysregulation, polyendocrinopathy and enteropathy, X-linked syndrome (IPEX). To better understand the relationship between the immune system and the reproductive system, we are investigating the reproductive phenotype of *Foxp3* mutant mice. We find that pituitary LH and FSH production in these mice are significantly decreased. Treatment of *Foxp3* mutant males with a GnRH receptor agonist does not stimulate normal levels of pituitary *Lhb* expression. Consistent with low gonadotropin levels, spermatogenesis in *Foxp3* mutant males is arrested. *Foxp3* mutant mice have significantly smaller seminal vesicle weights than wild type littermates indicative of lower levels of testosterone. This is likely an underlying cause of the cessation of spermatogenesis, with the primary cause residing higher in the HPG axis. We do not detect *Foxp3* expression in the hypothalamus, pituitary, or testis, suggesting that the infertility seen in *Foxp3* mutant males is a secondary effect, possibly due to suppression of the reproductive axis by the immune system.

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False Positives and negatives: Predictive Power of Standardized Test Scores

Academic institutions count on the predictive power of standardized test scores to reveal students' ability to succeed academically in higher education. Therefore, academic institutions' selection processes rely heavily on these objective measures of academic potential. Researchers have been investigating whether there are any selection errors in using standardized exams to predict academic performance. This research indicates that standardized tests may not account for many other non-cognitive characteristics that could contribute to students' academic success. The present study examined academic motivation, academic self-concept and implicit theories of intelligence, and student-faculty interaction as predictors of college grade point average, beyond standardized test scores. Participants included undergraduate students enrolled in the Center Academic Success (CAS) program and in psychology courses.