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3-2007

## 2007 Abstract Book

Undergraduate Research Forum

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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, see [www.siu.edu/~reach](http://www.siu.edu/~reach).

The forum is being held in conjunction with the 2007 Research Day (sponsored by Phi Delta Kappa, Phi Kappa Phi, Sigma Xi, and the Society for Neuroscience) and the Illinois Junior Science and Humanities Symposium.

# UNDERGRADUATE RESEARCH FORUM

## ABSTRACTS • 2007



Student Center Ballrooms  
March 26, 2007  
Southern Illinois University Carbondale

“Undergraduate research—whether it is in the laboratory, studio, library, or clinic—enhances, expands, and enriches the academic experience for students and faculty. The undergraduate student who engages in research under the tutelage of a talented faculty member is well on his or her way to a positive and fruitful education and career.”

—*John Dunn, Interim 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**  
**March 26, 2007**  
**Southern Illinois University Carbondale**

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**Program**

Judging of posters: 8:30 a.m. – 12:30 p.m.

Poster session: 1:00 – 3:30 p.m.

Award presentations: 3:30 p.m.

**REACH Director**

Jo Nast, ORDA

**Organizer**

Stefani Hall, ORDA

**Sponsors**

Office of the Provost

Office of Research Development and Administration (ORDA)

**Special Thanks**

Prudence M. Rice, Linda Martin, Don Rice, and Marilyn Davis

## STUDENT PARTICIPANTS / MENTORS

1. Folasade Ajayi ..... Howard Herme
2. Carl Alexander ..... Rajib Mallick
3. Shannon Banning ..... Mary & Gary Kinsel
4. Janie Blanks\* ..... John Nicklow
5. Jared Boulds ..... Mary & Gary Kinsel
6. Abby Burnam ..... Meera Komarraju
7. Seth B. Clark ..... Eric Jacobs  
and Stephanie Dollinger
8. Robert Clodi ..... Robert Swenson
9. Brittany Corrigan\* ..... Douglas Smith
10. David Dalzotto\* ..... Sara Baer
11. Amy N. Davis ..... Michelle Kibby
12. Ty-Nica Davis ..... Kitty Martin
13. Laura Deaton ..... Michael Young
14. Esteban del Valle\* ..... Najjar Abdul-Musawwir
15. TeSha Dozier\* ..... Rheeda Walker
16. Andrea Fee ..... Karen Reinke
17. Stacie Flood ..... Frank Wilhelm
18. Sean Z. Goodin\* ..... April Strader
19. Miranda Griffith ..... Mark Kittleson
20. Christine Guerra ..... Robert Clinton
21. Molly Hacker ..... Loretta Battaglia
22. Djamilatou S. Hangadumbo\* ..... Laurie Achenbach
23. David Hutson ..... Fran Harackiewicz
24. Laura Hepp Kessel ..... Wayne Paris
25. Nadia Lopez\* ..... Susan Ford
26. Danielle Malmquist ..... Stephen Dollinger
27. Jayme Marler ..... Wayne Paris
28. Russell McKeith ..... Karen Jones
29. Ryan McMillen\* ..... Karen Renzaglia
30. Jennifer Musselman ..... Robert Swenson
31. Jennifer Musselman ..... Robert Swenson
32. Aileen O'Hearn ..... Barbara Crandall-Stotler
33. Jeremy Pierce\* ..... Michael Hoane

[cont.]

## TO LEARN MORE ABOUT THE UNDERGRADUATE RESEARCH PROGRAM AT SIUC, VISIT

[www.wiu.edu/~reach](http://www.wiu.edu/~reach).

**Joanie Weber & Dr. Deborah Bruns**

Department of Educational Psychology and Special Education

*Findings across Screening Tools (FAST)*

The objectives of this project are to: (1) review existing child data across three different developmental screening tools, namely the Ages and Stages Questionnaire (ASQ), the Ages and Stages Questionnaire-Social Emotional (ASQ-SE), and the Parents' Observations of Infants and Toddlers (POINT), (2) conduct item analysis across the three instruments, (3) use the item analysis to analyze the POINT for its ability to identify infants and toddlers at risk for developmental delay, and (4) prepare the results for dissemination in the form of a manuscript and two conference proposals and, as appropriate, presentations.

Within the last three months fifty parents have completed the POINT, ASQ and ASQ-SE on their infants and/or toddlers. Currently, the at-risk status determined by each of the three screening tools is being compared to determine the reliability of the POINT. These results will be completed by March and presented on the poster in table format. Preliminary findings show differences in outcomes determined by the screening tools. Future research will determine the validity of the POINT through further analysis of those scores that are in disagreement regarding at-risk status. The procedures for the upcoming research project will be stated and possible implications for practice will be discussed.

- |   |                          |
|---|--------------------------|
| 34. Amanda Rabideau.....                  | Prema Narayan            |
| 35. Robyn Reeves*and Suzanne Milano ..... | Cory Byers               |
| 36. Antonio Rodriguez.....                | Celeste Montoya-<br>Kirk |
| 37. Brenda Sanders .....                  | Thomas Thibeault         |
| 38. Brenda Sanders* .....                 | John Haller              |
| 39. Kurt Seifert* .....                   | Frank Wilhelm            |
| 40. Erin Shanle* .....                    | Aldwin Anterola          |
| 41. Kelly Smith* .....                    | Diane Davis              |
| 42. Sarah Tatlock .....                   | Laura Kidd               |
| 43. Colby Thompson.....                   | Wendy Bigler             |
| 44. Brett Timmons* .....                  | Anita Kelly              |
| 45. Laura Tolar*.....                     | Lisabeth DiLalla         |
| 46. Brock Troupis .....                   | Jonathan Gray            |
| 47. Amarachi Ukabam .....                 | Julie Partridge          |
| 48. Jodi Vandermyde* .....                | Gregory Whitledge        |
| 49. April Vigardt* .....                  | Jorge Hernandez          |
| 50. Willie Walker.....                    | Mandara Savage           |
| 51. Joan Weber.....                       | Deborah A. Bruns         |

\*Recipient of a 2006 Undergraduate Research/Creative Activity Award.

**Folasade Ajayi**

Department of Health Care Management

*How Does Increasing Physical Activity through Use of Public Transit Affect Obesity and Asthma?*

The present study was designed to explore the effects public transportation has on physical health mainly in urban populations. Interviews were given to people within the Little Village community in Chicago. They were asked questions about their experience with CTA and possible effects on physical health. Two factors were taken into consideration in evaluating their responses. The factors include: the distance traveled on public transportation and how long it takes. The other factor addressed how often the people used public transit. Evidence was found and concluded, the more often one takes public transportation the more positive effects on physical health are constructed.

The study also addressed how public transportation can have effects on asthma as well as obesity rates. Air pollutants and smog in urban populations are rapidly increasing due to rising use of cars and other factors. Smog and air pollutants can cause irritation to asthmatics. Using a mass public transportation system can reduce air pollutants and decrease those irritants.

**Willie Walker**

Department of Technology

*Examining Flow at Grab-N-Go: A Case Study of an Atypical Dining Experience*

The purpose of this study is to examine the efficiency of serving walk-up customers in a residence hall carry-out facility at Southern Illinois University Carbondale. The ability to serve customers in a timely fashion is the hallmark of a well-designed food service establishment. For this study, customer arrival and food usage rates were tracked within one residence hall Grab-N-Go during the month of April 2006. Daily census, quantity of food cooked, and the rate at which food was taken was collected. Results indicate that (1) only 29% of the students that entered the Grab-N-Go had the option to receive hot food, and (2) due to the wait time, many students who would have chosen hot food items changed their minds to purchase pre-packaged food items. This research identifies areas to improve the service of customers by reducing waiting times and predicting peak demand.

## April Vigardt

Department of Plant and Soil Science

### *Effects of Vermicompost on Growth and Establishment of Broccoli Transplants*

In the Horticulture industry there is a need for a substitution for peat-based soilless potting media. The current research into alternatives has been interesting as other byproducts from the processing of raw materials show promise in having comparable physical properties and in some cases superior nutritional qualities. In this study vermicompost (castings from the red worm *Eisenia fetida* fed food wastes and cattle manure), was studied as a soilless media substitute in the greenhouse growth of a fall crop of 'Green Goliath' broccoli in the varying percentages based upon weight, 0%, 10%, 25%, 50%, 75%, 100%. Half the plants of each treatment were fertilized with Peters 20-10-20 at three weeks old, transplanted to the field at 6 weeks old with 6 plants per established at 12 weeks. Baseline data was taken on germination rates, plant height, node #, nod height and # of leaves, nutrient analysis was obtained on the 6 media mixes and plant tissue analysis was performed on 12-week-old plants at establishment. A spring crop of the same cultivar is currently being grown for transplanting in mid-March.

The results obtained from the nutritional analysis of the 6 media mixes showed an increase in electrical conductivity, phosphorus, nitrate, calcium, magnesium, zinc, iron, and aluminum along with the increase of the percentage of the vermicompost. Potassium, ammonium, sodium, and copper increased up to 75% vermicompost and then dropped off with ammonium the most significant. Statistical analysis on the baseline data has yet to be completed but results seem to lean towards a higher germination with 25% vermicompost substitution, better growth up until transplantation with 50% substitution, but overall establishment better with 75-100% substitution despite slower initial growth. The treatments receiving the fertilizer seemed to enhance growth but the increase of plant health could still be seen with the increase in vermicompost. Growing a fall crop of broccoli in southern Illinois is not easy and often temperatures over 90°F (well above the preferred daytime range of 60-70°F) were common in both the greenhouse and the field causing a hardening of the stems due to heat stress. Insect pressure from grasshoppers was also heavy which may have had some impact. As of now the spring crop of broccoli being grown in the greenhouse has shown a higher germination rate with the 25% and 100% substitution. This may be due to the lower daytime temperatures of 70-80°F which are closer to the optimum.

## Carl L. Alexander

Department of Civil and Environmental Engineering

### *Analysis of Pavement Response under Different Environmental Conditions*

The Maine Department of Transportation (MDOT) spends more than \$50 million on design, construction and rehabilitation of asphalt pavements every year. Many of the design procedures are based on 1986 or 1993 AASHTO design guide, which is primarily empirical in nature. This guide was developed on the basis of field tests conducted in Illinois in the 1960s. It is obvious that the results from these field tests are not applicable for a different climatic region, and also for today's traffic and construction materials. Furthermore, significant changes in layer properties occur as a result of change in seasons, and it is critical that such changes are determined, documented, and considered properly for design, construction and load restrictions. Analysis of data from properly instrumented pavement test sections can provide invaluable information for proper design and rehabilitation of pavements. Such data is also absolutely necessary for adopting a more rational design process – such as the Mechanistic-Empirical design method being proposed by the NCHRP (to be adopted as a standard design guide by AASHTO).

This project determined critical responses, compared measured responses with responses predicted with material properties determined through laboratory, field testing and analysis, and evaluated changes in material properties with changes in environmental and traffic conditions. The study involved analyzing instrument data and obtaining materials for different layers from the test section and conducting tests for full characterization of the different materials. This characterization provided data that will be used to compare predicted responses to measured responses.



**Shannon Banning, Segu Zaneer, Mary E. Kinsel and Gary R. Kinsel**

Department of Chemistry & Biochemistry

*Quantitative Determination of Methimazole in Veterinary Pharmaceuticals*

Hyperthyroidism (i.e., an overactive thyroid gland) is a disorder common in older cats. Cats having hyperthyroidism suffer weight loss despite exhibiting increased appetite and food intake. Methimazole (mercaptomethylimidazole) is prescribed for the medical management of this condition. Because methimazole has a bitter taste, it is compounded into a meat-based chewable tablet to improve palatability. The purpose of this project is to develop an analytical method to quantitatively determine the amount of methimazole in compounded meat-based tablets. The extracts are analyzed by High Performance Liquid Chromatography (HPLC) and the isolated methimazole is detected using an ultraviolet-visible detector at 254 nm. The results for methimazole-spiked tuna, chicken, and liver-based tablets will be presented in this poster. Specifically, statistical data focusing on percent recovery and intersample variability will be discussed. For the tuna-flavored tablet the percent recovery is 98.58% with a standard deviation of 1.749. The chicken-flavored tablet had a percent recovery of 98.55% with a deviation of 1.678. The percent recovery of methimazole from the liver-flavored tablet is lower than that obtained from the chicken- and liver-based tablets at 89.36% with a deviation of 1.26. Potential use of the developed extraction method and subsequent analysis for quality control of compounded methimazole will also be discussed.

**Jodi M. Vandermyde**

Department of Zoology – Fisheries

*Otolith and Muscle  $\delta^{15}\text{N}$  Reflect Fish Trophic Level and Distinguish Fish from Forested and Agricultural Streams*

Stable nitrogen isotope ratio ( $\delta^{15}\text{N}$ ) of muscle tissue is frequently used as an indicator of an animal's trophic level and reflects the environment it inhabits. For example,  $\delta^{15}\text{N}$  of muscle tissue has been used to distinguish fish from streams that drain agricultural vs. forested watersheds in New England. Stable isotopic and trace element compositions of fish otoliths (earstones) are increasingly being used as indicators of fish environmental history, but no measurements of otolith  $\delta^{15}\text{N}$  have been reported in literature. Otoliths represent an ideal structure for environmental history studies because they contain rings that provide a record of age and permanently retain chemical signatures from previous environments.

The objectives of this research were to determine whether there is a relationship between  $\delta^{15}\text{N}$  in fish otoliths and  $\delta^{15}\text{N}$  in muscle tissue, to determine whether otolith and muscle  $\delta^{15}\text{N}$  differ among fish collected in forested and agricultural drained watersheds in southern Illinois, and to determine whether  $\delta^{15}\text{N}$  of otoliths within environments differs among fish from different trophic levels. Five to 10 fish of different trophic levels were collected from 7 locations, including 3 streams draining primarily forested watersheds, 3 streams draining primarily agricultural lands, and SIUC's Campus Lake. Sagittal otoliths and muscle were removed from each fish and sent to University of Alaska for  $\delta^{15}\text{N}$  for analysis by an isotope ratio mass spectrometer. Results indicated a significant correlation between muscle and otolith  $\delta^{15}\text{N}$ , with muscle  $\delta^{15}\text{N}$  averaging 1.1‰ higher than otoliths. There's also a significant difference of fish otoliths and muscle  $\delta^{15}\text{N}$  between forested and agricultural draining watersheds. Comparisons of otolith  $\delta^{15}\text{N}$  among trophic levels were inconsistent, possibly due to small sample sizes of predators or omnivory. Otolith  $\delta^{15}\text{N}$  could be used as an indicator of a fish's environmental and dietary history over its lifetime instead of a month with muscle  $\delta^{15}\text{N}$ .

**Amarachi Ukabam**

Department of Health Education

*Diversity in the NCAA: A Study of Division I Black Female Head Coaches*

The purpose of this study is to qualitatively look into the experiences of Black female head coaches in the NCAA. There is a huge inconsistency within intercollegiate sports. This can best be described as the under representation of Black women as head coaches in NCAA Division I athletics. Black females are the focus of this study because the design was developed to discover views and experiences of Black female coaches. Three Black female coaches who are currently coaching in the NCAA were recruited for this study. After seven questions were asked, major themes were coded and identified based on individual transcriptions. Through question-based coding, many themes emerged and standards of minority report card, Blacks and inferiority, sociology of women coaching women, support, and female student-athlete transition. The number of black female coaches in the NCAA as a whole is extremely low. There appears to be a tendency for administrators to hire coaches to complete the necessary requirements for the annual equity reports for race and gender. On the other hand, female student-athletes are not expressing their desire to become a head coach. Female student-athletes have the tendency to go to school for other careers besides coaching.

**Janie Blanks**

Department of Civil Engineering

*Operation of Multi-Reservoir Systems Using a Genetic Algorithm*

Modeling flow in a multi-reservoir system is a complex hydrologic problem that is restricted by the limitations in optimizing systems of complex, non-linear equations. The models that do exist are limited to linear parameters and are only applicable to the one system for which they were designed. Because of this, reservoirs in multi-reservoir systems are typically operated independently of one another and in a non-optimal manner. In the event of a local storm, this type of operation can cause severe flooding problems. For example, the Illinois River is controlled by a series of seven dams that are each operated independently of the others. The river, in turn, experiences extreme water level fluctuations which threaten native plant and animal habitat, as well as residential property, in the Illinois River and its floodplain. The model that is being developed through this research shows how to minimize storm-related flooding of any multi-reservoir system. The model uses a genetic algorithm that works with Microsoft Excel to generate an optimal solution to this complex non-linear problem. Thus, unlike existing mathematical models, this model can account for the nonlinearities that are present in all physical multi-reservoir systems. A model like this one does not currently exist and has great potential. The potential is increased due to the fact that this model can be applied to any multi-reservoir system and, because it is formatted with Excel, it is very user friendly.

**Jared S. Boulds, Mary E. Kinsel, Gary R. Kinsel**

Department of Chemistry & Biochemistry

*Determination of the Efficiency of Current Methods of Protein Identification*

With the growth of proteomics-based research, protein identification has become one of the most important applications of modern mass spectrometry (MS). Protein identification is commonly accomplished by using two-dimensional polyacrylamide gel electrophoresis (2D PAGE) to separate a complex protein mixture, followed by excision of the protein spots of interest, in-gel trypsin digestion and extraction of the tryptic peptides for MS analysis. Increasingly, there is interest in identifying protein spots present at sub-picomole levels. As the amount of protein present in an excised protein spot decreases, the recovery of tryptic peptides from the gel becomes more important. Successful protein identification using MS analysis is highly dependent upon the peptide recovery. Thus, it is essential that the in-gel trypsin digestion protocol be optimized to maximize peptide recovery. Numerous attempts to optimize the in-gel digestion protocol have evaluated the success of their modified protocols by comparing the number of unique tryptic peptides (i.e., percent protein sequence coverage) observed in the mass spectrum. It is not clear that an increase in the percent protein sequence coverage genuinely reflects an increase in peptide recovery. This poster will compare two novel approaches to gauge peptide recovery. Specifically, the tryptic peptide ion signal intensity and the Matrix Science Mascot MOWSE score will be compared to the standard approach for determining peptide recovery based on the percent protein sequence for the model protein, bovine serum albumin.

**Brock Troupis**

Department of Speech Communication

*A New Look at Terrorism: Media Framing of Direct Action Environmentalists*

With the ‘Green Movement’ and the increased concerns over the environmental health of our planet, there has been a significant rise in environmental activism in the United States as well as around the globe. The focus of my presentation is to illustrate the connection between the rhetoric used to describe domestic environmental terrorism and international terrorism. In this post 9/11 world, the paradigm of the “War on Terror” has had a significant influence on American media and journalism. The mainstream American media often portrays these so-called ‘eco-terrorists’ in a very similar fashion to terrorist groups threatening America from abroad. I analyze American news magazines and newspapers to conduct a content analysis of the rhetoric used to describe what constitutes a terrorist organization. Repeatedly, discourse connects similar descriptions of these domestic, direct-action environmental groups to the traditional conception of international, “extremist” terrorist organizations. American media organizations frame groups like the Earth Liberation Front under the same rhetorical umbrella as internationally recognized terrorist organizations such as al-Qaeda. They execute this communication strategy by using similar definitions provided by government bodies that portray these groups as threats to national security and the American way of life. My presentation provides details of how theoretical framing is used to persuade the public into perceiving that the symbolic violence of direct action environmental groups is equivalent to the violent acts committed by international terrorists.

## Laura Tolar & Faculty Advisor Dr. Lisabeth F. DiLalla

Department of Psychology

### *Parent-Child Interactions and Child Externalizing Behaviors*

Prior research indicates that children displaying difficult temperament are more likely to exhibit aggressive behavior. Additionally, more coercive parenting has been shown to lead to higher externalizing scores in children. Thus, both child and parent behaviors have been linked to increases in externalizing problems in children. In the present study, it was hypothesized that children who were more attentive and engaged with others during the interaction at age 4 would be rated by their parents as exhibiting fewer externalizing behaviors at age 5. Additionally, it was hypothesized that parents who exhibited less warmth and sensitivity during interactions with their 4-year-olds would rate their children at age 5 as having more externalizing problems. The purpose of this project was to longitudinally examine the relation between potentially difficult child and parent behaviors and child temperament at age 4, and parent-rated perceptions of aggression at age 5. Participants consisted of 108 four-year-old twins from the Southern Illinois Twins and Siblings Study. During testing both twins and one parent engaged in a videotaped 10-minute triadic teaching task. Bayley's Infant Behavior Record was used to assess the target child's behavior during the teaching task. Independence/Autonomy and Object Orientation (O-O) were chosen as measures of attention to task items and engagement with parent. These two scales were averaged to form a reliable Self-Absorption scale. Parent behaviors were rated for verbal warmth, sensitivity, and positive affect. When the twins were 5 years old, the parents completed the Child Behavior Checklist. The Externalizing subscale was used for these analyses. Preliminary regression analyses demonstrated that a lack of parent verbal warmth and increased child Self-Absorption at age 4 are predictive of child externalizing problems at age 5 ( $F(5,41) = 2.66, p < .05$ ). When analyses were repeated separately by sex, these same variables predicted Externalizing for boys ( $F(5,15) = 4.02, p < .05$ ) but none were significant for girls. These results show evidence of a relation between 4-year-old parent and child behaviors and 5-year-old child externalizing behaviors. Lack of parental warmth and extreme independence in boys appear to be risk factors for later externalizing problems during the preschool years.

## Abby Burnam and Meera Komarraju

Department of Psychology

### *Why Do College Students Procrastinate?*

College students differ in the degree to which they procrastinate. Some work hard and others may delay completing their work until the very last moment. Students may procrastinate due to many different reasons that may include external and internal factors. Students also differ in their need for perfectionism and the type of academic motivation that drives them (intrinsic, extrinsic, or lack of motivation), and these factors may be related to their procrastination. This study examined the relationship between students' academic motivation, procrastination, and perfectionism.

A total of 283 undergraduate students completed a survey that included the 28-item Academic Motivation Scale (Vallerand, Pelletier, Blais, Briere, Senecal, C., & Vallieres, 1992); the 35-item Procrastination Assessment Scale (Solomon, & Rothblum, 1984), and the 35-item Multidimensional Perfectionism Scale (MPS), (Frost, Martin, Lahart, & Rosenblat, 1990).

A correlation analysis indicated that task aversion, dependency, lack of assertion, risk taking, rebellion, lack of confidence, laziness, fear of success, peer influence, and being overwhelmed were positively and significantly correlated with procrastination. Of all the subscales of perfectionism, doubting actions was positively correlated with procrastination. Finally, intrinsic motivation was positively correlated with procrastination and amotivation was negatively correlated with procrastination. These results were further supported by a forward regression analysis which showed that laziness and peer influence were the two reasons that explained most of the variance in procrastination. Similarly, regarding perfectionism, doubting actions and personal standards explained most of the variance in procrastination.

Students who procrastinate do not enjoy the challenge of learning and seem to doubt their ability to complete their tasks. In particular, they are more likely to procrastinate if they feel lazy, perceive their tasks to be unpleasant, lack self-confidence, and if their peers procrastinate.

**Seth Benjamin Clark**

Department of Psychology

*Progressive Ratio Schedules of Token Delivery: Breakpoint as a Function of Terminal Reinforcer Unit Price*

Schedules of token reinforcement consist of three interlocked contingencies—the token production schedule (e.g., lever pressing), the exchange schedule (e.g., marble deposits), and the terminal reinforcer schedule (e.g., reinforcer magnitude). Previous researchers examined the effects of terminal reinforcer schedule requirements on behavior maintained by a progressive ratio (PR) schedule of token delivery. They found that break points decreased as a function of the terminal reinforcer schedule requirements. In the following study, I will attempt to systematically replicate this research in a token reinforcement context. The procedure is generally the same, but there will also be a manipulation of the amount of reinforcement as the terminal reinforcement schedule requirement increases so that unit price is held constant at 1.0 across conditions (1 marble for 1 reinforcer, 2 marbles for 2 reinforcers, or 3 marbles for 3 reinforcers). As long as the unit price stays constant, the changing values of the cost and benefit should not have an effect on breakpoint based on the second prediction of the behavioral economics theory. This research is testing the prediction and measuring if unit price is the sole determinate of behavior.

**Brett A. Timmons\*, Christopher C. Green, and Anita M. Kelly**

Fisheries and Illinois Aquaculture Center and Department of Zoology

*Snail Consumption and Preference by Redear Sunfish and Redear Sunfish ♂X Warmmouth ♀ Hybrid*

Heavy trematode infestations in aquaculture facilities have resulted in massive mortalities in small fish and unmarketable flesh in large fish. Rams-horn snails (*Helisoma trivialis*), pouch snails (*Physa* spp) and fish are intermediate hosts for digenetic trematodes. The only control method for trematodes is to break the life cycle. Redear sunfish (*Lepomis microlophus*), a molluscivore species, have mouth gape limitations, rendering them incapable of consuming large snails. To overcome this limitation, redear were hybridized with the larger gaped warmouth (*L. gulosus*). The hybrid had a larger mouth gape relative to length versus redear. A 50mm hybrid consumed 76.7% of snails measuring 4mm, while 50mm redear consumed 80% of the 4mm snails. Redear sunfish did not consume snails  $\geq 7$ mm, but the hybrid did consume 6.6% of the 7mm snails. The 76-102mm hybrids consumed 90% of the snails 6mm. Preference studies indicated that 76-102mm hybrid consumed 100% of rams-horn compared to only 19% of the physa available, whereas, redear (50mm) consumed 100% of the rams-horn and 50% of the physa in the tank. These data suggest that size of snail consumed by the hybrid was larger than redear of the same size and that redear and hybrids preferred rams-horn snails over physa.

**Colby Thompson**

Department of Geography

*Comparative Microclimates of Restored vs. Intact Bottomland  
Hardwood Wetland in Southern Illinois*

The purpose of this study is to determine if the microclimate of the restored wetland matches up with that of the intact wetland, and if it does not match then how well does the restored wetland mimic the intact wetland. What are the differences in the microclimates of a restored bottomland hardwood wetland vs. an intact bottomland hardwood wetland in Southern Illinois? Using a set of 10 HOBO sensors, I am collecting surface temperature and dew point temperature. These two wetlands are located within close proximity to each other in southwestern Jackson County, Illinois. 3 sensors are being placed in the intact bottomland wetland and 7 others placed in the restored bottomland wetland. I will also track the effect of leaf-on and leaf-off as well as ice-on, ice-off in these two wetland forests. Since this is an ongoing study I do not have a large amount of data but by the end I hope to be able to shed some light on these microclimates. My data have shown results that in the restored/managed bottomland hardwood forests temperatures have been running a degree or two cooler than those in the intact forests. My conclusions are that the restored bottomland hardwood forests are flooded for the majority of the winter and the intact forests require a river to flood. Thus, most of the incoming energy is used to evaporate the water that is covering the forest floor causing the air temperatures to be cooler.

**Robert Clodi**

School of Architecture

*Upper Mississippi Delta Planning Interest*

The intent of this research is to study and document a significant historical topic around the confluence of the Ohio and Mississippi River at Cairo, Illinois. Specifically this research focuses on digitizing the historic relevancy of Cairo. This presentation is the graphical interpretations of the research, which derived from historical references. The significance of this project is to inspire new development and preservation of the city, while maintaining its identity through its master plan. This project will provide the tools that are pragmatically useful for the city of Cairo to make well-informed decisions. New maps and graphical representations of the city will provide as a platform for further development that will have an impact on subdivided portions of the city, if not the entire city. The end product of this research is to provide documentation for future planners and the development of Cairo, Illinois. The final analysis of the mapping will provide existing conditions and a list of organizing principles including zoning, land use, transportation, and urban design concepts such as: districts, landmarks, pathways, nodes, and edges. The goal is to revitalize the economy of Cairo and produce historical interest in the Upper Mississippi Delta.

**Brittney Corrigan**

Department of Psychology

*Vagus Nerve Stimulation Is an Effective Treatment for Traumatic Brain Injury: A Skilled Forelimb Reaching Assessment.*

Traumatic brain injury (TBI) often results in the loss of physical and mental function. To date, there is no effective cure for TBI. Treatment following TBI relies almost exclusively on rehabilitation and physical therapy. Despite this, most patients suffer enduring motor, sensorimotor and cognitive impairments. In this study, skilled forelimb reaching movements in the rat (which are similar to those of humans) were assessed before and after brain injury. Vagus nerve stimulation (VNS), an experimental treatment previously reported by Smith et al. (2005, 2006) to enhance functional recovery following TBI, was used. Three groups of male Long-Evans hooded rats (TBI-VNS, TBI-No VNS, Sham) were trained to use their right forelimb to reach for, grasp, retrieve and consume a sugar pellet in a specialized reaching box. Following training to criteria, these rats were subjected to an experimental fluid percussion brain injury of moderate severity under anesthesia. The animals' ability to use their right forelimb to reach for the pellets after injury was assessed every two days for two weeks. Sham injured rats showed complete recovery and were reaching at criterion levels within 4 days of the surgery. Rats that were brain injured and did not receive VNS treatment showed persistent deficits in the ability to successfully reach for the pellets during the two-week assessment period. The rats that received VNS treatment after TBI recovered more quickly and were able to reach successfully for the pellets as early as 8 days after the injury. The results of this study demonstrate that VNS is a promising treatment for TBI. Clearly, VNS accelerates and enhances the recovery process, promoting even the recovery of complex movements such as skilled forelimb reaching that require the integration of learning, memory, motor and sensorimotor coordination.

**Sarah J. Tatlock and Dr. Laura Kidd**

Department of Fashion Design and Merchandising Program

*Tying the Past Together: A Corset History*

The curve of the hips into the waist and around the bust has often been referred to as 'womanly curves'. These natural curves have always been admired and, at times, exaggerated to create the much sought after and fashionable hourglass shape. In particular, the corset has been used by cultures throughout history to obtain the desired silhouette. At times ridiculed, the corset has also been considered a necessary and important undergarment.

The primary goal of this project is to date three corsets housed in the SIUC Historic Costume Collection using standard, non-evasive conservation techniques. A Power Point presentation was also created illustrating the historical timeline in the development of the corset. The Power Point presentation will be a valuable aid for students who are interested in the evolution of corset design. The information on these slides will help students understand how the corset was first created, how the design of the corset evolved, and how corsets became considered both dreaded and desirable pieces of foundation wear. The presentation will also be used a teaching aid in the historic costume classes that are part of the Fashion Design & Merchandising Program's core curriculum.

**Kelly Smith and Dr. Diane Davis**

School of Information Systems and Applied Technologies

*An Examination of Undergraduate Ethical Requirements and Instructional Methods in the Accounting and IT Disciplines*

In light of several recent highly publicized unethical acts in businesses through the country (e.g., Enron and WorldCom), there has been a renewed sense of urgency for ethics education. This year-long study examined ethics instructional practices in information technology (IT) and accounting departments across the nation. A survey was developed after an extensive literature review that examined the ethics course requirements in the departments, the teaching methodologies employed by faculty, and their perceptions about ethics instruction methods and materials. A convenience sample of IT and accounting ethics instructors across the nation were selected to pilot test the survey. Revisions were made based on their feedback. An email message with a link to the online survey was sent to a random selection of the faculty members asking them to complete the survey. The purpose of this study was to determine: (1) what the ethics requirements were for undergraduate students, (2) what instructional methods were used to teach ethics, and (3) if there was a difference in the requirements and methods used between IT and accounting disciplines.

**David Dalzotto**

Department of Forestry

*Resource Responses to Restoration and Management of Giant Cane (*Arundinaria gigantea*) Restoration in Southern Illinois*

Giant cane (*Arundinaria gigantea*) is a native bamboo species that was once densely distributed along bottomland waterways of the southeastern United States. Land conversion to agriculture and grazing decreased the distribution of giant cane-dominated communities, known as canebrakes, into isolated pockets. Limited to <2% of the historic range, canebrakes are now considered an endangered ecosystem. Giant cane has been replanted in a former agricultural field in southern Illinois. Two rows containing forty linear plots were established in 2001. A combination of fertilizer and burning treatments were applied to the cane restoration. Light, soil moisture, and inorganic nitrogen availability was measured monthly from October 2006 through January 2007 in the cane restoration and an early successional field. The percent of photosynthetically active radiation (PAR) penetrating the soil surface was used as an index of plant biomass. PAR was higher in the early successional field than the giant cane restoration in all months ( $P < 0.0001$ ) and lowest in the fertilized cane plots. Soil moisture was slightly lower in the fertilized cane plots than the successional field over all months ( $P = 0.10$ ). At the end of the growing season, the successional field had higher soil moisture than the cane restoration ( $P = 0.021$ ). Ammonium and nitrate contributed equally to total inorganic N in both systems. There was no difference in inorganic N availability ( $P > 0.10$ ) among management treatments or between the systems due to low overall inorganic N levels. Light and inorganic N were positively correlated with soil moisture ( $P < 0.05$ ), and these relationships were driven by higher PAR and inorganic N in the successional field. Giant cane restoration effectively conserves nitrogen regardless of the low level of nitrogen fertilization, and burning treatments and low levels of fertilization effectively increase the growth of giant cane without N loss.



**Amy N. Davis and Michelle Y. Kibby, Ph.D.**

Department of Psychology

*Is There a Relation Between Self-Esteem and Executive Functioning?*

Low self-esteem (SE) is often associated with depression and anxiety (internalizing disorders). Several studies have focused on the relations between internalizing disorders and executive functioning (EF). However, relatively few studies have addressed the possible relation between SE and EF. The purpose of the present study is to examine the relations between SE, internalizing disorders, and EF.

Participants included 21 children with dyslexia, 29 with ADHD, and 30 controls, ages 8-12 years. Those with co-morbid dyslexia and ADHD were excluded. The groups differed in IQ and gender but were comparable in age. Using IQ and gender as covariates, children with ADHD had significantly more symptoms of depression than did controls. As groups were comparable in SE, the total sample was used for the remaining analyses. For the traditional EF measures, Academic Competence (AC) was correlated with Tower-Rule Violations and BASC depression. However, BASC Anxiety and Depression were not significantly correlated with the EF measures. In addition, when controlling for depression, AC remained correlated with Tower-RV. For the BRIEF, Familial Acceptance (FA) was negatively correlated with Inhibition. AC was negatively correlated with Monitor and Emotional Control. Moreover, BASC Anxiety was correlated with most of the BRIEF scales, and Depression was correlated with all of them. When controlling for anxiety and depression, there were no significant correlations between self-esteem and the BRIEF.

When using more traditional measures of EF, there were limited significant relations between SE, internalizing disorders, and EF. However, there were several between SE, internalizing disorders, and EF when using the BRIEF. Hence, the BRIEF may be more sensitive to affect/SE and/or SE/affect may be related to EF, but it takes a more sensitive measure to detect effects. Internalizing problems may partially mediate the relation between SE and EF.

**Erin K. Shanle and Dr. Aldwin Anterola**

Department of Plant Biology

*ent-Kaurene and Kauran-16-ol Formation in the Moss Physcomitrella patens:  
Functional Identification of a Unique Diterpene Cyclase*

Kauran-16-ol is the major secondary metabolite of the moss *Physcomitrella patens*. It is a diterpenoid that based on its structure may have been derived from geranylgeranyl diphosphate via a two-step cyclization to form *ent*-kaurene, followed by the addition of water. In flowering plants, *ent*-kaurene is formed via two enzymes, namely copalyl diphosphate synthase and *ent*-kaurene synthase. In fungi, these two activities reside in a single enzyme. We isolated a copalyl diphosphate synthase-like gene from *P. patens* and expressed it in *E. coli*, which was then assayed by incubation of the bacterial lysates with geranylgeranyl diphosphate. GC-MS analysis of the hexane extract from the assay mixture revealed *de novo* formation of both *ent*-kaurene and kauran-16-ol. This suggests that the copalyl diphosphate synthase-like gene from *P. patens* is a bifunctional diterpene cyclase, having both copalyl diphosphate and *ent*-kaurene synthase activities, as well as an additional hydratase activity. *ent*-Kaurene formation in *P. patens* is therefore more similar to those of fungi than those of flowering plants, which raises intriguing questions about the origin of diterpene cyclases in plants and fungi.

**Kurt D. Seifert and Dr. Frank M. Wilhelm**

## Zoology

*An investigation of Chaoborus Daily Migration and Predation Rates in the Wildlife Pond during Autumn*

The aquatic larvae of the phantom midge, Chaoborus, are voracious predators on zooplankton and can control whole-lake community composition. In addition, previous studies have shown that Chaoborus can occur at unusually high ( $> 15\,000/\text{m}^2$ ) densities in ponds of the US Midwest. My objectives were to determine: 1) the density of Chaoborus in the Wildlife Pond and 2) estimate the whole-lake predation rate of Chaoborus on zooplankton. To monitor the vertical migration of Chaoborus in the Wildlife Pond on the campus of Southern Illinois University, water column and bottom samples were collected every 6 hours for 24 hours on two occasions. During the day Chaoborus were virtually absent from the water column, while at night they were present in the water column at densities  $>8,000$  individuals/ $\text{m}^3$  at some sites. The density of Chaoborus in bottom sediments exceeded  $50,000$  individual/ $\text{m}^2$ . These densities clearly show that not all individuals migrated into the water column on each date. To estimate the whole-lake predatory impact of Chaoborus, we multiplied the water column density by a predation rate of 3 zooplankton/Chaoborus/day (determined from previous studies). Thus, approximately  $24,000$  zooplankton/ $\text{m}^3$  would be consumed on a daily basis from the Wildlife Pond by the Chaoborus. Given such high calculated predation rates, it is likely that Chaoborus has greater impacts on zooplankton communities in small lakes and ponds of the Midwest than previously estimated.

**Ty-Nica Davis**

Department of Communication Disorders and Science, Rehabilitation Institute

*Blooms' Taxonomy Revised: A Look at Course Syllabi Objectives within Undergraduate and Graduate Disciplines in the SIUC Rehabilitation Institute*

This study evaluates course syllabi objectives in order to ascertain on what level of the Revised Bloom's Taxonomy these objectives fall. Thirty syllabi were randomly selected from instructors who teach 400 and 500 level classes within the Rehabilitation Department at Southern Illinois University Carbondale. Using the Taxonomy Table, two people rated course objectives based on two dimensions of Bloom's Taxonomy: Cognitive Processes and Knowledge. The hypotheses were: (1) course syllabi within the undergraduate disciplines of the Rehabilitation Institute will on average fall in the Understanding Cognitive Processes and in the Conceptual Knowledge dimension; and 2) course syllabi on the graduate level of instruction, on average, will fall in the Evaluating Cognitive Process dimension and in the Procedural Knowledge dimension. The data gathered were analyzed using a logistic regression test that analyzes ordinal data. Knowledge gathered from this study could assist instructors in developing clearer objectives for future classes.

**Laura Deaton**

Department of Psychology

*Effects of Rare Events on Frequency Estimation*

Previous research has demonstrated that people are susceptible to biases when making judgments using probabilities. It is generally easier for people to make frequency estimates, but do these biases still affect the judgment process? This study will look at the role rare events play in frequency estimation. Due to their distinctive nature, it is suspected that the rare events will cause an overestimation or underestimation of the true mean. We will also look at the psychological mechanisms that guide these estimations. Frequency will be estimated as a function of distribution. This will show that people use a logarithmic scale to interpret frequencies, and that data should be interpreted using the geometric mean instead of the arithmetic mean.

**Brenda K. Sanders**

University Studies

*Can the Medical Model of Teaching Be Used to Better Prepare Principals?*

This mixed method experimental study will explore whether the medical model of teaching can be used to better prepare principals. Principals of elementary, middle, and high schools in Illinois will be the sample for this research. The medical education model of training is hypothesized to improve the identified present problems with principalship training, including lack of clinical experience (didactic problem-based learning); lack of competency validation and credentialing; lack of leadership training; lack of continuing training (staying abreast of changes); and lack of performance standards. Data will be gathered using mixed methods, both quantitative and qualitative. A survey using a Likert-like scale will be administered. Interviews will be conducted. SPSS will be used in data analysis. Interviews and observations will be examined using descriptive analysis. Independent variables will be identified as will dependent variables. Findings are expected to show that using the medical model of teaching principalship training can be used to better prepare principals.

**Brenda K. Sanders**

University Studies

*Empathy and Prejudice: Can Holocaust Education Produce Positive Change in Adolescents' Views of Others?*

This mixed method experimental study explored whether a one-person Holocaust performance could significantly increase adolescents' empathy level index scores. Thirty-two, 7<sup>th</sup> grade participants were gathered from two rural Southern Illinois Middle Schools. Participants' gender and ages were comparable in both classrooms. External influences were hypothesized to produce significant increases in adolescents' index empathy level scores. Data were gathered using mixed methods, both qualitative and quantitative. Pre- and post-test scores were administered using Brenda Bryant's Index of Empathy Scale (1982). Each class was videotaped while watching the performance and four students were interviewed afterwards. A four-factor ANOVA was performed using SPSS. Interviews and observations were examined using descriptive analysis. Independent variables were: time, location, gender and ethnicity. Pre- and post-test scores were the dependant variables. Findings showed significant increases in participants' Empathy Level Indexes. Therefore, brief educational interventions like the one utilized in this study can produce positive change in the way adolescents view others.

**Esteban del Valle**

School of Art and Design

*The Narcissus Effect: A Mixed-Media Exploration of the Relationship between Self-Portraiture and Graffiti Art.*

The infinite process of self-reflection led me to the myth of Narcissus; the beautiful boy that fell in love with his own image, leading him to stare at himself until he withered away, never able to obtain his true love, himself. My current direction in the arts has led me to incorporate my graffiti upbringing and explore mixed-media, still keeping spray paint as a major component. I spent the majority of my formative years in a culture that was rooted in the concept of establishing your own fame. A basic path to notoriety, writing one's name everywhere, became the principal subject matter in every piece of art I made. The correlation between a graffiti artist's tag and an oil painter's self-portrait hit a chord with me. In this project I am painting or incorporating pictures of graffiti pieces of my tag name, to act as a ground for my paintings. I am working over them with various mediums to produce self-portraits and then sand the graffiti images back into the piece. Self-exploration and a desire to make a more "honest" self-portrait became my path for discovering my current subject matter. This research allows me to juxtapose the abstract forms and bright colors of graffiti art, with more traditional figurative work. I am researching the visual and psychological effects of forms and colors and how they can be manipulated to be more effective at self-expression. This project concludes with a body of work of 20 paintings which will be exhibited in my thesis show in May 2007. My research on self-reflection will hopefully lead me to personal "truths" applicable to others.

**TeSha S. Dozier**

Department of Psychology

*The Relations between Body Preferences and Psychological Well-being among African American Women*

Researchers have shown that African American women can also be at risk for body dissatisfaction and eating disorders (e.g., Williamson, 1998). It is anticipated that African American women who are acculturating with the European American culture will be more exposed and more likely to experience body image distress. The current study will examine potential psychological influences and acculturation on body dissatisfaction among African American women. Approximately 100 African American undergraduate college students will complete a survey to assess anxiety, self-esteem, depression, life and body satisfaction. An acculturation measure will also be used to assess African American women's level of acculturation to the European American culture. It is hypothesized that acculturated African American women are more likely to be dissatisfied with their body type. Also, African women will prefer smaller body types compared to their current body type.

**Antonio Rodriguez**

Department of Political Science

*The Role of the Spanish Language News Media in Chicago's Latino Political and Grassroots Organizing*

The growth of the Spanish language news media has led to questions surrounding its role in the Latino community. What is the role of the Spanish language news media in Latino politics? How and to what extent does the Spanish language news media help facilitate a Latino political agenda? How does the Spanish language news effect Latino political development? This paper will examine the role of the Spanish language news media in Latino communities, specifically looking at how the Spanish language news media effects Chicago Latino politics and grassroots organizations. I have chosen to investigate this role by conducting a series of interviews with news media representatives, Latino elected officials and leaders in Latino organizations. I have found that the Spanish language news media does have a significant role in the Latino community, as part of a Latino Advocacy Coalition. The Spanish language news media is able to facilitate a Latino political agenda in the following ways: 1) it is an accessible source of information; 2) it covers issues of concern for the community that may not be covered in the mainstream news media; 3) it is an effective mobilizing tool for the community by providing a direct link between the Latino leadership and community. The open advocacy role of Spanish language news media is what distinguishes their presence in the Latino community from that of mainstream news media and demonstrates the political significance of the Spanish language news media in Latino communities. In addition, I find that this advocacy role of Spanish language news media becomes more important during times of crisis, as was demonstrated by the significant role it played in the recent immigrant rights marches.

## Robyn Reeves and Suzanne Milano

Department of Cinema and Photography

### *SciGirls*

It is generally agreed that girls in the U.S. start losing interest in science around the middle school age. Since there are few positive or realistic portrayals of women in science by media, girls generally have no female role models in scientific fields. SciGirls is a collaborative, ongoing, after school and summer project of WSIU Public Broadcasting, the Carterville Intermediate School, The Science Center, and various colleges at SIUC. Monthly science investigations are held at a variety of locations in the region.

In this creative media and field research project we plan to 1) create a documentary film that follows SciGirls through a series of science investigations; 2) provide the girls with learning opportunities using our media tools; and 3) test the girls' perceptions of media representations of female roles in science, math, and technology. The goal for this project is to deliver a compelling film that will capture the spirit of SciGirls.

Our research design examines the changes over the school year in the learning and attitudes among female students exposed to SciGirls programming and those not exposed to SciGirls programming.

Data collection is currently underway. After securing Human Subjects approval and parental consent, we administered surveys to the girls of Carterville Intermediate School. Another round of surveys will be administered in April. Presently, our data shows that the girls who are in the SciGirls program (compared to those who are not) are doing better in Math and Science classes. These girls are also more aware of the women displayed by media in scientific roles; and they can name men and women that they personally know in scientific fields. We will continue surveying until the conclusion of our documentary film.

## Andrea Fee

Department of Psychology

### *Emotional Modulation of Spatial Attention: Spiders and Snakes vs. Guns and Knives*

The purpose of this study was to advance findings concerning modulatory effects of fearful stimuli of both an evolutionary and learned basis on spatial attention. Previous research has shown that spatial attention can be modulated both consciously (Armony & Dolan, 2002) and nonconsciously (Fox, 2002) by fearful facial expressions. Research on the fear-initiated modulation of spatial attention has been limited to the use of fearful facial expressions as stimuli. Thirty undergraduate psychology students participated in a modified dot-probe task. Pictorial stimuli obtained from the International Picture System (IAPS; Lang, 1999) were chosen on the basis of two categories: fear-relevancy and evolutionary relevancy. Examples of evolutionary fear stimuli consist of snakes, spiders, and bugs, while examples of learned fear stimuli consist of knives, guns, and syringes. Two stimuli briefly presented simultaneously to the left and right of fixation (33ms) were immediately followed by a neutral mask (100ms) presented to block nonconscious stimuli from conscious perception. Subsequently, participants were instructed to locate a target dot which appeared either on the left or right side immediately following the presentation of the stimuli. Divided attention trials consisted of either two neutral or two fear-relevant nonconscious stimuli, while cued spatial attention trials consisted of one neutral and one fear-relevant nonconscious stimulus, where the fear stimulus was either congruent or incongruent with the target dot. Mean reaction times are significantly faster when the target dot was congruent, rather than incongruent, with the fear-relevant stimulus. A significant main effect was found independent of fear type (evolutionary or learned). These results are consistent with past research that found fearful facial expressions' capabilities of modulating spatial attention. The results also indicate that additional fear stimuli, like snakes and guns, also have nonconscious modulatory effects on spatial attention and these stimuli can be of either an evolutionary or learned basis.

**Stacie Flood**

Department of Zoology

*Responses of a Macroinvertebrate Community to Fluctuating Salinity*

Quantifying the impacts of anthropogenic activities on freshwater ecosystems is necessary to prevent their degradation and ensure humanity's continued well-being. One widespread anthropogenic impact is the introduction of salt (secondary salinization) into aquatic ecosystems which has potential lethal and sub-lethal effects on biota. Assessing the impact of salinization at community and ecosystem levels is difficult using traditional rapid bioassessment protocols and diversity indexes because subtle changes in the abundance and composition of species are not readily detected. The goal of this project was twofold: to adapt a graphical method to easily interpret complex species diversity data over time, and to assess and quantify changes in the macroinvertebrate community of a small pond, impacted by an oil-field brine spill, in association with remediation efforts using the technique. Using traditional methods, no statistically significant differences in diversity were found before and after remediation. However, using the graphical method, I was able to easily see subtle differences in the community composition. Although the changes were probably not significant to the community in this case, it showed that the new technique was capable of detecting small changes and should therefore be of use to the environmental monitoring field in general.

**Amanda Rabideau, Mary Unland, Michelle Rankin, and Prema Narayan**

Department of Physiology.

*Immunohistochemical Analysis of Steroidogenic Enzymes in the Testis and Ovaries of Mice Expressing A Constitutively Active Luteinizing Hormone Receptor.*

The pituitary gland secretes a gonadotropin, luteinizing hormone (LH), which binds to the luteinizing hormone receptor (LHR) in the Leydig cells of the testis to produce testosterone and the theca cells of the ovaries to produce androgens. Human chorionic gonadotropin (hCG), which is very similar to LH, also binds LHR. In previous studies in our laboratory, a yoked hormone-receptor complex (YHR) was genetically engineered by covalently linking hCG to LHR in a single polypeptide chain, producing a complex with similar signaling characteristics as a constitutively active LHR. To determine if YHR was active *in vivo* and assess the physiological consequences of premature LHR activation, transgenic mice expressing YHR were produced. Comparison of male transgenic mice (YHR<sup>+</sup>) to the wild type (WT) mice, showed that before the onset of normal puberty YHR<sup>+</sup> mice had significantly higher levels of testosterone, and in females ovarian estradiol (E<sub>2</sub>) and progesterone were significantly elevated. Due to the elevated levels of the steroid hormones, it was hypothesized that the enzymes in the steroidogenic pathway would be elevated. The goal of this study is to examine the cell specific expression of key steroidogenic enzymes in testicular and ovarian sections by immunohistochemistry. The data indicate that the steroidogenic enzymes are expressed in the Leydig cells in males and the theca and luteal cells in females. In the males, it appears that the size of the Leydig cell clusters is smaller in YHR<sup>+</sup> mice. A novel finding was the specific detection of P450<sub>scc</sub> in the germ cells. The levels of p450c17 appeared to be decreased in YHR mice at 5 weeks of age, which is consistent with the previously observed decrease in RNA levels. Overall, our results suggest that the stimulation of steroidogenic enzymes to produce testosterone is transient, but the negative feedback effect of testosterone is sustained.

**Jeremy L. Pierce and Dr. Michael R. Hoane**

Department of Psychology

*The Preclinical Efficacy Testing of COG1410 in a Rat Model of Traumatic Brain Injury*

Previous studies have shown that a novel compound synthesized from the active binding region of apolipoprotein E is effective in reducing behavioral and histological pathology following traumatic brain injury (TBI) in the mouse. The present study evaluated a novel version of this peptide, COG1410 in a rat model of TBI. COG1410 is significantly smaller (1410 daltons) than earlier versions of this peptide (COG133, 2171 daltons) which may enhance passage through the blood brain barrier, thus allowing for greater pharmacologic action. This study evaluated the ability of COG1410 to reduce behavioral and histological deficits in a rat model of TBI, which allows for a more thorough evaluation of behavioral deficits relative to a mouse model. Injured animals received unilateral controlled cortical impact injuries to the sensorimotor cortex and received either COG1410 in a high dose (0.8 mg/kg), low dose (0.4 mg/kg), or saline 30 minutes following injury via a tail vein infusion. Control animals underwent surgical prep, were not injured then received saline via the tail vein. Starting on day 2 following injury the animals were tested on a battery of behavioral measures to assess sensorimotor (vibrissae-forelimb placing and forelimb use-asymmetry), and motor (tapered balance beam) performance. Administration of the 0.8 mg/kg dose of COG1410 significantly improved recovery on the vibrissae-forelimb and limb asymmetry tests. However, no facilitation was observed on the tapered beam. The low dose (0.4 mg/kg) of COG1410 did not show any significant differences compared to vehicle. Lesion analysis revealed that the 0.8 mg/kg dose of COG1410 significantly reduced the size of the injury cavity compared to the 0.4 mg/kg dose and vehicle. These results suggest that a single dose of COG1410 facilitates behavioral recovery and provides neuroprotection in a dose and task-dependent manner.

**Sean Goodin, Alicia Kiechler, Donna Wendt, April Strader**

Department of Physiology

*Gender Differences in the Central Melanocortin System Regulation of Food Intake and Energy Expenditure*

The central melanocortin system is critical for proper regulation of energy balance. The effects of the melanocortin receptor antagonist agouti-related peptide (AgRP) on food intake and body weight are well described in male rodents. AgRP-receptor interactions are believed to involve the co-receptor syndecan-3. Mice deficient for syndecan-3 are resistant to diet-induced obesity partly due to a reduction in food intake (males) and a disproportionate increase in energy expenditure (females). Given the different behavioral and metabolic mechanisms male and female syndecan-3 deficient mice use to prevent increased adiposity, we hypothesized that sex would also determine differences in the response to centrally administered AgRP. To achieve this, a single intracerebroventricular (ICV) injection of either vehicle (saline) or AgRP (5 $\mu$ g/ $\mu$ l) was given prior to the onset of the dark phase in male and female age-matched rats. Food and body weights were measured for seven days. Additionally, during the first 24 hours rats were placed in an indirect calorimeter to assess energy expenditure. AgRP caused a robust and sustained hyperphagia of similar magnitude in both male and female rats. Interestingly, the orexigenic effect of AgRP lasted only three days in females compared to five days in males ( $p < 0.05$ ). Despite the shortened effect of AgRP in females, both sexes showed identical (between 6-8%) increases in body weight, both 24 hours and 7 days after central AgRP administration ( $p < 0.05$ ). During the first 12 hours (dark phase) after AgRP administration males showed no change in oxygen consumption ( $\dot{V}O_2$ ) while female rats lowered their  $\dot{V}O_2$  by 20% ( $p < 0.01$ ). Later, during the light phase, both sexes showed a similar reduction in  $\dot{V}O_2$ . The changes in  $\dot{V}O_2$  were accompanied by immediate and significant ( $p < 0.05$ ) increases in respiratory quotient (RQ) values indicating a metabolic shift away from fat utilization. The sex-specific disparity in energy expenditure may explain why females gain the same percentage of body weight as male rats in the absence of prolonged hyperphagia. These findings are consistent with our hypothesis and indicate that male and female rats employ different physiological mechanisms to attain identical increases in body weight gain in response to central AgRP.



## Miranda Griffith

Department of Workforce Education and Development

*Cyber Risk-Taking: College Students' Attitudes toward Risk Behaviors on Social Networking Sites*

MySpace and Facebook have recently become popular social networking sites among college students. As indicated by recent media coverage, there are risks involved with these social networking sites. This study explores how college students' attitudes toward posting personal information have been affected by their involvement with MySpace and Facebook. A thirty-question survey was sent to Health Education instructors across the United States who distributed them to their summer students; 145 respondents provided demographic information, time management practices, and self-reported risk behaviors on social networking sites. The data was examined using descriptive analysis and thematic coding. The researcher's analysis demonstrates that college students using MySpace and Facebook are surprisingly aware of the risks involved with disclosing personal information online, and yet continue to engage in this behavior. This study is important to public health education because of the potential impact of MySpace and Facebook on the college student population. Education and outreach efforts regarding online behavior should be implemented throughout colleges and universities to help students better understand how they are putting themselves at risk.

## Aileen E. O'Hearn and Barbara J. Crandall-Stotler

Department of Plant Biology

*New Findings on the Apical Organization and Biology of the Liverwort Pleurozia*

The liverwort *Pleurozia* has traditionally been classified as a remote lineage of the leafy liverworts (*Jungermanniidae*). Although it possesses traits such as ranked leaves, axillary antheridia and acrogynous gynoecia, which are characteristic of the leafy liverworts, it possesses a lens-shaped apical cell that is typical of the simple thalloid liverworts. Some recent molecular phylogenetic studies have placed *Pleurozia* in a simple thalloid group of liverworts, but not unequivocally. In addition, several species produce unique, elongate tubes of which the function is unknown. The objectives of this study are to expand the knowledge of apical cell anatomy in the genus, as well as to investigate the morphology and potential function of the tubes. A combination of serial paraffin sectioning and SEM techniques were used on 3 species. Their apices, in addition to ones already studied, have lens-shaped apical cells. This suggests that the evolutionary history of *Pleurozia* lies with the simple thalloids rather than the leafys. The dissected tubes contained various remnants of invertebrates and fungal hyphae, and had unique cell shapes and arrangements of the inner walls. These findings suggest that the tube structures may play a role in the subsistence of the plant.

## Jennifer Musselman

School of Architecture

*Service to the Region: The Utilization of the Historic Structures Report*

Historic Structure Reports (HSR) provide a valuable foundation for the rehabilitation, restoration, stabilization or reconstruction of an historic building. They are particularly important if the proposed work involves fabricating significant missing architectural or landscape features, recapturing the appearance of a property at one particular period of its history, removing later additions, or substantially modifying existing historic fabric. The HSR is an invaluable tool for local municipalities in the attainment of funding for restoration to historic structures within their communities.

As an undergraduate research assistant, under the direction of Robert Swenson (Associate Professor of Architecture), the research I have undertaken involves the compilation of Historic Structures Reports for the Village of Thebes Courthouse and the Kornthal Church Memorial. This research was completed in collaboration with previous undergraduate research assistants, summer preservation students, community volunteers, as well as our professors and mentors. I was instrumental in the gathering of primary and secondary documentation of the developmental history of each structure verifying legitimacy of its historical background and context. Such research is instrumental to the continued preservation of these two structures and impacts the eligibility of such projects for future funding. This is exemplified by the Kornthal Church's scheduled restoration workshop in the Summer of 2007. This workshop is being held by the Heritage Conservation Network in conjunction with the Preservation Summer class of the SIU School of Architecture.

## Christine Guerra

Department of Political Science

*Government of the Soul: According to Plato and Aristotle*

The focus of my study is the government of the soul as understood by Plato and Aristotle, two classic philosophers. Both thinkers believed that the soul consists of three parts: intellect, spirit, and appetite. Virtues such as wisdom, courage, and temperance are the tools of self-control which allow for the government of the soul. Typical of natural law thinkers, Plato and Aristotle organized ideas hierarchically. A right-ordered political hierarchy consists of morality at the top, followed by law, and then politics. When Medieval philosophers such as Machiavelli, Hobbes, and Rousseau emerged they rearranged the political hierarchy by placing politics at the top, law second and morality last. Soul government is a topic unique to the Classic philosophers because thinkers who followed did not believe in an individual's ability to govern oneself. Medieval philosophers thought of passion as a key motivator for behavior. For this reason emphasis is placed on politics because it is the responsibility of the ruling structure to govern society so as to maintain order.

I will be conducting a qualitative study on the governing of the soul by means of analytical observations derived from a close reading of primary philosophical, biographical, and historical texts. The purpose of this research is to address the trend of moral decline, which many scholars argue is a continuing issue in modern society. Consulting the thoughts of the classic philosophers is an effective way of addressing this current socio-political issue.

**Molly S. Hacker, L. L. Battaglia, and D.J. Gibson.**

Department of Plant Biology

*Potential Effects of the Invasive Celastrus Orbiculatus Thunb. on Soil Seedbank Composition*

*Celastrus orbiculatus* Thunb. is a non-native invasive species that is a serious threat to native forest communities in southern Illinois. Our objective was to examine how the presence of *C. orbiculatus* is related to the composition of the soil seedbank. Soil samples were collected from 12 patches of *C. orbiculatus* within the forest of Giant City State Park, Union and Jackson counties, IL, along with a sample taken at each of 12 adjacent non-*Celastrus* sites. These 24 paired samples were placed in flats in the SIUC greenhouse; seedbank recruits are being identified and counted so that comparisons can be made between the soil seedbank from *Celastrus* sites to those from non-*Celastrus* sites. Preliminary data indicate that invaded sites have more species in the seedbank than non-invaded sites (Wilcoxon signed rank test  $s = 26.5$ ,  $p = 0.037$ ), suggesting that *C. orbiculatus* may invade species-rich patches within the forest or facilitate establishment of other species. Investigation of the potential effects of *C. orbiculatus* on the native soil seedbank may be useful in efforts to control this invasive species.

**Jennifer Musselman**

School of Architecture

*Adaptive Reuse of Historical Structures: Cultural Development of Rural Communities via the Reinterpretation of the WPA Library*

In this study, I examined the adaptive reuse of Works Progress Administration (WPA) funded public libraries, specifically the courthouse in the village of Thebes. I explored whether adaptive reuse results in a culturally advantageous outcome for the communities which house similar facilities. Analysis of field data, site analysis, case study information, and graphic imaging data were explored for their relevance to WPA library preservation and cultural objectives. An in-depth analysis of WPA documentation highlighting the history and significance to rural library development was used to provide context for the study. The significance of this research could impact the direction taken by the Village Board and the Mayor as they guide the future cultural development of the Village of Thebes. This study could aid in providing an identity that highlights the importance of the preservation of rural communities throughout the historical districts of Illinois.

## Ryan McMillen

Department of Plant Biology

*The Diversity of Stomata in Non-seed plants: A correlation between structure and Genome Size*

Stomata are minute pores found exclusively in land plants except for liverworts. Enabling gas exchange, these structures are essential to the process of photosynthesis (the conversion of solar energy, CO<sub>2</sub>, and water to sugar and oxygen) and are highly researched in seed plants. The presence of stomata on land plants is an immense evolutionary step because unlike pores the stomata apertures have the ability to be controlled by drawing water in and out of the surrounding guard cells. In many studies of the seed-bearing vascular plants, stomatal size has been found to have a positive correlation to the C-value, or genome size. However there have been no parallel investigations of seedless vascular plant stomata. For this study we targeted *Psilotum*, *Marsilia*, *Equisetum*, *Ceratopteris*, *Isoetes*, *Huperzia* and two species of *Selaginella* and measured stomatal guard cell length and width using light and scanning electron microscopy. Genome sizes were acquired from Kew Botanical Garden's online database and analyzed with the stomatal measurements using linear regression. Reconstruction of ancestral genomes is critical to understanding organism diversity and genome evolution. Thus using these and similar types of data, genome sizes of fossil plants can be estimated from fossil stomata measurements giving us a more complete history of changes in genome size over hundreds of millions of years. Ongoing studies are being conducted in the mosses and hornworts to further correlate this data across the tree of life.

## Djamilatou Saidou Hangadoumbo

Department of Microbiology

*Intrinsic Bioremediation of Perchlorate as Indicated by the Activity of the Chlorite Dismutase Gene *cld**

Perchlorate, an environmental contaminant, can be converted in a two-step reaction by the activity of bacteria known as Dissimilatory Perchlorate-Reducing Bacteria (DPRB). Two enzymes are involved in this process. In the first step, perchlorate is converted to the toxic chlorite by the activity of perchlorate reductase. Then, the toxic chlorite is converted to an innocuous form by the chlorite dismutase encoded by the *cld* gene. The *cld* gene has been used to identify DPRB in environmental samples. Typically, the removal of perchlorate from the environment involves the addition of DPRB to a contaminated site in a process called enhanced in-situ bioremediation.

Previously, the *cld* gene was detected in an environment that was not undergoing engineered stimulation. However, it was not known whether or not the *cld* gene was actively being expressed *in situ*. Therefore, the main hypothesis of the current project was that perchlorate reduction can occur without engineered stimulation. To address this question, total RNA obtained from contaminated soil was used in a Reverse-Transcription-nested Polymerase Chain Reaction (RT-PCR) approach using the *cld* specific primers. We demonstrated the presence of *cld* mRNA in a contaminated environmental soil sample to which only acetate was added as an electron donor. This demonstrates the capacity of *in-situ* remediation of perchlorate without the necessity of adding known DPRB.

### David Hutson and Jonathon Fesler

Department of Electrical and Computer Engineering

#### *E-Textile Antennas*

As wireless personal technologies are becoming more commonplace, further research is focused on antennas with improved capabilities. One area of research utilizes antennas made from electronic textiles or e-textiles. Such antennas are referred to as e-textile antennas. The area of interest in terms of applications involves wireless personal communications, which would include cellular phones, PDAs, hand held computers, as well as various other wireless devices. The SIU College of Engineering Antenna and Propagation Lab is interested in integrating e-textile antennas into articles of clothing to improve signal quality and possibly increase range for signal reception. Our current tests have involved antennas constructed for use at a center frequency of 2.4 GHz, which is a frequency most commonly used in today's wireless devices. Current studies involve fashioning an antenna shape from the electronic textile to form a patch. The patch is then secured to standard fabric by means of an adhesive sheet and a hot iron, much like an iron-on appliqué. These antennas have proven to be just as good, in terms of radiation pattern and antenna efficiency, as the micro-strip antennas found in cell phones. The SIU College of Engineering Antenna and Propagation Lab is currently researching whether similar results can be obtained from an e-textile antenna created with embroidery. An e-textile antenna made with embroidery could prove to be more durable and longer lasting than the antenna in patch form.

### Russell O. McKeith, Karen L. Jones, and Darcie Hastings

Department of Animal Science

#### *Do Ergot Alkaloids Alter Ruminal E. coli concentrations in an In Vitro System?*

Fescue is a grass species that is abundant through the continental United States, and is the major form of forage in the United States. A toxic fungus inhabits fescue, which produces ergot alkaloids. These ergot alkaloids cause vasoconstriction and alter livestock metabolism. Potentially, these ergot alkaloids could alter the species composition of microbial flora in the rumen of a cow. The aim of this study is to determine if *E. coli* concentrations are altered by an ergot alkaloid in an *in vitro* dual flow continuous culture system. Four fermenters were used as a model of the cow's rumen and ran for 10 days. The average fermenter volume was 1234 ml. The liquid dilution rate was maintained at 12% hr<sup>-1</sup> using the buffer of Weller and Pilgrim with urea omitted. The solids turnover rate was 0.66 hr<sup>-1</sup>, which should provide a mean solids retention time of 15 hrs. All diets were Timothy Clover ground hay. Dietary analysis of this hay is 99.5% DM, 43.8% ADF, 56.3% NDF, and 8.1% protein. Inoculum was collected from a ruminally cannulated Holstein cow grazing fescue pastures. Ruminal contents were strained through 2 layers of cheese cloth until sufficient volume was attained to fill all fermenters. Two of the fermenters contained added ergotamine D-tartrate (Fluka 45510, 1.0 microgram/150 grams of feed) while the other two received no ergotamine D-tartrate. Liquid fermenter samples were collected every 36 hrs. The samples will be diluted to 1,000,000X dilution using tryptic soy broth water and then plated on a 3M-petri film selective for *E. coli*. The Petri-films were incubated for 48 hrs at 38°C, and colony counts were determined. Samples were collected 6 times for each run, and data will be analyzed using the proc mixed procedures of SAS for repeated measures. We expect that *E. coli* counts will decrease over the 10-day trial in the ergot alkaloid treatment.

**Jayne Marler**

School of Social Work

*Rural Agency Clinical Research: One Researcher's Experience*

In an age of reduced government support establishing the results of interventions is one way rural agencies can better compete for funding. It was for this purpose and to meet requirements for a Social Work research class that this project was conducted. After completing a qualitative research proposal under the supervision of the professor, the appropriate agencies were contacted to request their participation. Nine agencies were contacted about the possibility of conducting interviews and/or focus groups with adults to discuss their attempts to cope with a particular type of personal problem (the type of agency will not be mentioned for confidentiality reasons). The reactions were: a) two directors were openly hostile towards any discussion of research and stated how meeting with clients would breach confidentiality; b) one director openly challenged the professionalism and competence of the supervising professor for even considering such an idea; c) while the six remaining directors were more considerate in their discussion or simply ignored the request all together. Ultimately, every agency rejected the request. Although highly speculative, some inferences can be made from the experience: a) there is not a clear understanding of H.I.P.A.A. regulations regarding client confidentiality; and b) the openly hostile and judgmental responses suggest a lack of understanding of research methodology and the positive role it can play within a clinical setting. This suggests the need for professional training programs to do a better job of educating agency staff as to the benefits of clinical research, help agency directors become better informed of appropriate patient confidentiality issues, and the need to establish a more supportive and collegial professional environment between agencies and academic institutions to help deal with disagreements and misunderstandings.

**Laura Hepp Kessel**

School of Social Work

*Adult Children of Alcoholics: An Exploration of the Effects with Residents of Rural Southern Illinois*

Adult children of alcoholics (ACA) are a diverse group of individuals who have dealt, are dealing with, or continue to deal with the effects that alcoholic parent(s) have had on their lives. The purpose of this work was to explore the emotional and behavioral consequences of being an adult child of alcoholic parent(s). A qualitative study was conducted with five individuals in rural Southern Illinois who met the selection criteria. They were each asked nine open-ended questions which were developed from a review of the relevant professional literature. The results suggest that being an ACA has significant long-term effects. For example, female ACAs described themselves as having poor self-esteem, were highly anxious, and submissive, although 75% of them indicated they would not tolerate such behavior from their spouse. Both males and females reported they did not understand what a 'normal' family consisted of, which had resulted in numerous relationship problems during their lifetimes. The findings suggest that being an ACA has long-lasting effects on every area of the individual's life, although it is important to note that none of those surveyed abused alcohol.

**Nadia Lopez**

Department of Zoology

*The Use and Preference of Structural, Food, Object and Social Enrichment of Captive Callitrichid Primates*

Zoos play an increasingly important role in the management, breeding, and survival of endangered species, including many primates. The goal of enrichment is to promote the physical and psychological well-being of captive animals (Shepherdson, 1998). Increasing the complexity of a captive environment, such as providing structural, food, social, and object enrichment, has been shown to elicit more markers of increased well-being. For this study, enrichment usage and preferences were observed in two species of callitrichid primates (n=7), cotton-top tamarins (*Saguinus oedipus*) and callimicos (*Callimico goeldii*), at Lincoln Park Zoo during a three-week period, using two-minute scan sampling. The hypothesis that animals show preferences for some types of enrichment over others was supported, as was the hypothesis that the two species would differ in their preferences. The results show that horizontal, stable supports (cages and platforms) were highly used to conduct social behaviors and are an important component of the structural enrichment provided. Preference in structure height was very apparent, with callimicos favoring heights at an intermediate level (1.5-3.0 m), while cotton-tops preferred higher supports (4.6m+). The cotton-top tamarins that were in a more naturalistic enclosure spent more time locomoting, clinging and using vertical supports. The callimicos that received food enrichment on-exhibit were observed feeding/foraging more often than the cotton-tops who do not receive food enrichment. Overall, behaviors such as feeding and foraging (4.6-7.5%) and locomotor (7.2-10.7%) were substantially less frequent in comparison to data from populations in the wild, although some of the results were similar to those seen in other groups of captive callitrichids. No stereotypic (repetitive, abnormal) behaviors were observed during the length of the study. Since little is known about both “natural” and stereotypic behaviors in callitrichids, further exploration in this area is needed to better understand animal behavior and ensure their well-being in captivity.

**Danielle Malmquist**

Department of Psychology

*Creativity and Mood*

The purpose of this study is to examine the relations between creativity and mood. A drawing task and a verbal task, as well as a self-assessed creative behavior inventory are used. The scores on these are compared to scores on two self-assessed mood inventories. This is done with two groups, one with no affect induction and one with a positive affect induction (e.g., being given a bag of candy). The group with the positive mood induction is expected to have higher scores on the creativity tasks and higher positive affect scores. Higher creativity is expected to predict positive mood.