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.
Undergraduate Research Forum
Southern Illinois University Carbondale
March 23, 2009

Program
Poster Judging Sessions: 8:30 a.m. – 12:30 p.m.
Public Viewing Session: 1:00 – 3:30 p.m.
Award Presentations: 3:30 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
Jim Allen, Univ. Core Curriculum
Laurie Bell, University Honors
Steve Belletire, Art & Design
Kelly Bender, Microbiology
Lizette Chevalier, C & E Engineering
Kathleen Chwalisz, Psychology
Terry Clark, Marketing
Buffy Ellsworth, Physiology
Jane Geisler-Lee, Plant Biology
Matt Giblin, Ctr. for the Study of Crime, Delinq., & Corrections
David Gibson, Plant Biology
Kelly Glassett, Curriculum & Instruct.
Michael R. Hoane, Psychology
Jyotuna Kapur, Cinema & Photog.
Punit Kohli, Chemistry

Chris Lant, Geog. & Env. Res.
Kimberly Leonard, Ctr. for the Study of Crime, Delinq., & Corrections
Derek Martin, Sociology
Prema Narayan, Physiology
Ryan Netzley, English
Wayne Parise, Social Work
Gabriela Perez-Alvarado, Chemistry
Michael Sears, Zoology
Sylvia Smith, Hospitality & Tourism
Julia Spears, McNair Scholars Prog.
Matthew Therrell, Geog. & Env. Res.
Richard Thomas, Zoology
Jesse Trushenski, Zoology/Fisheries
Mesfin Tsige, Physics
Matt Whiles, Zoology

Special Thanks
Prudence M. Rice, Julia Wettstein, Don Rice, and Marilyn Davis
STUDENT PARTICIPANTS / MENTORS

1. Kathryn Adams .................. Stephanie C. Dollinger &
   Benjamin Rodriguez
2. Olanrewaju Ari Adeniyi .......... Gary Butson
3. Joseph Batir* .................... Harvey Henson, Jr.
4. Catrina Bowen ................. Matthew Schlesinger
5. Raquel Brown .................... James MacLean
6. Conisha Brownlee ............. Sharon Peterson
7. Sean Cameron ................... Joel Nadler
8. Joshua Chin ..................... Matthew Schlesinger
9. C. Grant Cox ................. Najjar Abdul-Musawwir
10. Andrew Dennhardt* .......... Michael Eichholz
11. Justin Dewey .................. David Gibson
12. Garcia Dunning ................. Stephanie C. Dollinger &
    Rebecca Weston
13. Jon Dyer ......................... Matthew Therrell
15. Heather Foslund ............... Michael Lydy
16. Casie Frink ................... Stephanie C. Dollinger &
    Lisabeth DiLalla
17. Lisa Furby* ..................... Ajay Mahajan
18. Jonate Govan ................... Mark Kittleson
    Peter Chometzky
20. Robert Ham* ................... Aldwin Anterola
21. April Harrison & .......... David Gibson
    Ashley Kaytor
22. Sarah Heck* .................... Michael Hoane
23. Christine Howard ............. Dale Vitt
24. Vernon Johnson ................. Mark Kittleson
25. Lauren Kacz* .................. Bakul Dave
26. Merry Lanker* ................ Sally Gradle
27. Antoinette Lettiere .......... Robert Swenson
28. Chasity Love* ................ Lichang Wang
29. Kevin Loyd* ................... Eric Jacobs

[cont.]
REACH (Research-Enriched Academic Challenge)

One of SIUC's undergraduate research programs, 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 www.siu.edu/reach. 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.

30. Levell Mables ................. Suzanne Nasco
31. Todd Marlo ..................... Karen Jones
32. Monica Mason .................. Novotny Lawrence
33. Gareth McGee* ................. Laurie Achenbach
34. Steve Middleton ............... Kim Gray
35. Amber Owens ................... Bakul Dave
36. Sarah Owusu .................... Buffy Ellsworth
37. Elizabeth Patterson* ........... Buffy Ellsworth
38. Ryan Perrin ..................... Stephanie C. Dollinger &
                                  Philip Burke
39. Alec Perry ...................... Shawna Pope
40. Amy Phegley & ................. Juliane Hernandez
    Litney Koch
41. Jane Pivovarnik ................. Laura Kidd
42. Mame Redwood* ................. Jane Geisler-Lee &
                                  Erin Palmer
43. Jamie Sexton ................... Robert Swenson
44. Shanna Strieker* ............... Jodi Huggenvik &
                                  Michael Collard
45. Laura Lyn Sullivan ............. Brenda O. Gilbert
46. Brian Thoele,
    Michael Doud &
    Stacey Gathers ................. Phil Anton
47. Kandace Vallejo ................ Kathy Hytten
48. Gary Vancil Jr* ............... Scott Ishman
49. Emanuel VonDrang .............. Stephanie C. Dollinger &
                                  Benjamin Rodriguez
50. Elora C. Voyles & ............. Joel T. Nader &
    Marybeth Hentrich ............. Margaret Stockdale
51. Stacie Wallace* ............... Rebecca Weston
52. Tara Webb ...................... Stephanie C. Dollinger &
                                  Michael Young
53. Sarah Wells* ................... Brian Lee
54. Ann Womack* .................... Michael Collard &
    April Strader

*Recipient of a 2008-09 Undergraduate Research/Creative Activity Award from the REACH Program
Kathryn Adams

Department of Psychology

*Emotion Regulation in Induced Social Anxiety Situations*

The research looked at self-focused attention, emotion regulation, and social anxiety. College students from the Psychology pool were used as the sample for the study. Four main surveys were used: the Focus of Attention Questionnaire (FAQ), the Fear of Negative Evaluation (FNE), Emotion Regulation Questionnaire (ERQ), and anxiety and social performance. It was hypothesized that when the attention is focused on the participant, anxiety levels of the participant would be higher. Emotion regulation was also studied in the participants.

Ann M. Womack, Dr. April D. Strader, Dr. Michael W. Collard

Department of Physiology

*Identification of Rat Genes with Altered Expression within the Ileum Following Ileal Interposition Surgery by Microarray Analysis*

As the prevalence of morbid obesity and co-morbid conditions such as type-II diabetes continue to rise worldwide, many seek treatment in the form of gastric bypass and other obesity surgeries. In patients who have undergone such treatment, improvements in glucose control are observed within days after surgery well before significant weight loss has occurred, suggesting that normalization of glucose levels are weight loss-independent. Although obesity surgeries were originally developed to promote and maintain weight loss through reducing stomach size and producing malabsorption by bypassing much of the small intestine, it has been hypothesized that increased activation through direct delivery of nutrients to the lower intestine (primarily ileum) may lead to changes in gene expression responsible for the resolution of glucose intolerance and reversal of type-II diabetes in obesity surgery patients.

To study changes in gene expression occurring in the ileum as a result of direct delivery of nutrients, a model was developed termed ileal interposition in which a rat’s ileum is removed from the lower intestine and interpositioned into the upper intestine thus isolating the effects of the lower intestine in the resolution of glucose intolerance. Unlike other types of obesity surgery, this procedure does not involve restriction or malabsorption. Following surgery, RNA from both normal and interpositioned ileum was isolated and analyzed for altered gene expression via cDNA microarrays. Target genes with changes in expression as indicated by microarray analysis have been selected, and changes in gene expression are now being confirmed by quantitative real-time PCR.
Sarah Wells, Benjamin Hale, Fatima Elazzoui, Ian Odigic, Brian Lee

Department of Chemistry and Biochemistry

Structural Characterization of the Zinc Finger Region of CPEB

Cytoplasmic polyadenylation element binding protein (CPEB) plays a central role in the translational regulation of mRNA in several vital biological processes, including cellular development, division, and senescence, by regulating polyadenine tail elongation via interactions with several other proteins. The structure of the carboxy terminal region of CPEB, which contains cysteine and histidine ligands for two zinc ions and appears to be a novel zinc finger, is of particular interest. This region has been shown to be necessary for mRNA binding at the uracil-rich cytoplasmic polyadenylation element. The three-dimensional structure of the zinc finger is currently unknown. Knowledge of its structure is vital for understanding how it binds to mRNA and other proteins and the role it plays in translational regulation. To elucidate this structure, we are currently purifying protein samples of that zinc finger expressed in an E. coli host using FPLC and gel filtration. We are also concentrating the purified protein for analysis and structural determination using nuclear magnetic resonance spectroscopy. Structural studies, in conjunction with mRNA binding assays will lead to a better understanding of translational regulation and the regulatory role of CPEB.

Olanrewaju Ari Adeniyi

Department of Civil and Mechanical Engineering

Wire Rope Vibration Analysis

Wire rope is used widely in engineering and in the construction industry. The problem is that the ropes can fail and the current systems that support the monitoring and maintenance of these wire ropes are inconvenient, costly and in some cases inconclusive. These failures of wire ropes can lead to enormous amounts of cost and possible catastrophic damage. The purpose of wire rope vibration analysis is to create a system to monitor the damaged wire rope through vibration testing. This testing will lead to a low cost in-situ sensor placed directly on or in wire rope specimens that will analyze elements of vibration. This system of monitoring will prevent excess cost from the replacement of good specimens of wire rope and damage caused by rope failure. This system is based on previous studies and uses of monitoring damage through vibration analysis. This can be found in the manufacturing industry in a process called machinery monitoring. This low cost effective system is used to sensor the level of vibration of moving parts in manufacturing processes. This process leads to the replacement of failing parts prior to damage. Analytical structural modeling results show the possibility to sensor damage in sections of wire rope modeled materials. These results will be compared to experimental results which will be tested in the same manor.
Joseph F. Batir and Harvey Henson, Jr.

Department of Geology

Verification of Unmarked Graves using Ground Penetrating Radar at the Holliday Cemetery

The Holliday Cemetery from the early 19th century includes veterans from the American Revolutionary War, the Mexican-American War, and the American Civil War and from several modern wars into the mid 20th century. Many burial plots were lost during the mid 20th century due to storm damage, vandalism, and neglect; however, the current land owner has begun restoration of the cemetery. A team of geophysicists from Southern Illinois University Carbondale were invited to assist with restoration efforts by investigating vacant areas within existing grave rows for evidence of unmarked graves.

Ground Penetrating Radar (GPR) was used at the historically significant Holliday Cemetery in Jackson County, Illinois, to identify unmarked graves and verify headstone placement for existing graves. The data were collected using 250 and 500 MHz frequency antennae and processed using EKKO View Deluxe software. Each GPR data set was processed with a sequence of mathematical data manipulation techniques to enhance the desired anomalies and increase signal to noise ratio. Processing and interpretation were focused on the front portions of the cemetery, where the Holliday family and relatives were located because it looked most promising to contain unmarked graves. A processing sequence was found that proved helpful to solve interpretation problems posed by the high tree density and clay rich soil.

Tara Webb and Dr. Michael Young

Department of Psychology

Delay Discounting in a Video Game Task

A first-person-shooter video game was adapted for the study of delay discounting, in which a larger, later reward is discounted as a function of its delay. This novel preparation was designed to address a criticism of previous research in the area. Delay discounting research has been criticized for the hypothetical tasks typically employed and lack of real consequences experienced. In the video game preparation, participants were presented with consequences of their choices on every trial. The recharge power of the player's weapon changed between game levels. Participants experienced four game levels, each with a different weapon power. The rate of firing as a function of weapon recharge determined discounting rate. Students also completed a typical paper and pencil delay discounting questionnaire, where they were asked to make hypothetical choices between smaller-sooner versus larger-later monetary rewards. There were small individual differences in sensitivity to changes in weapon power but large differences in degree of impulsivity. Behaving impulsively in the video game was detrimental to the progress of the player, which seemed to have an effect on behavior as levels progressed. By the final level of the game, many of the players who had behaved more impulsively throughout the earlier levels began to display increased amounts of self-control. The video game task was an effective way to measure delay discounting and behavior was shaped by consequences experienced. Future analyses will examine the questionnaire task's delay discounting and whether it correlates with video game discounting.
Stacie Wallace

Department of Psychology

"I was only Playing"

The current study explores men’s and women’s intention when using partner aggression and violence and the context of violence. Examination of these factors will improve our understanding of interpersonal aggression in the heterosexual relationships of 50 young adults between the ages of 20 and 27. The perception of each participant’s use of aggression as well as their partner’s use of aggression and motives are examined. This project consists of both quantitative and qualitative data collection; however, the qualitative analysis of semi-structured interviews is most informative. Gender differences in the perceptions of violent and aggression behaviors will also be examined in order to identify how women and men's perceptions differ. An examination of the intention behind behaviors identified by participants as “play” such as teasing, wrestling, hitting, pulling hair, etc. will be examined as well. Several themes have emerged in the data including: play, sex dominance/power/control, seeking attention, anger, jealousy, and affection. In addition, participants said that when they playfully tease and make fun of their partners, they usually mean what they say but remain playful. In the event that their partners get mad, they can say "they were only playing."

Catrina Bowen and Dr. Matthew Schlesinger

Department of Psychology

Effects of Different Feedback Schedules on Accuracy during Memory-Guided Tracking

Previous research on motor skills has shown that the planning of a movement is influenced by whether or not visual information is available during the movement (i.e., visual feedback). In particular, different movement strategies are selected when the participant knows in advance whether or not visual feedback will be available as they move. In the current study, we asked participants to track a series of moving objects with a computer mouse. During some trials, the object was fully visible (visual feedback), while in others it was briefly occluded (no feedback). Participants were divided into two groups. First, in the blocked condition, the visible and occluded trials were presented separately so that participants knew in advance whether visual feedback would be available. Second, participants in the random condition were tested with both visible and occluded trials, in a random sequence. We hypothesized that participants in the blocked condition would perform significantly better than participants in the random condition during the occluded trials. Unexpectedly, no differences were observed between the two groups during tracking of the occluded target. Our findings suggest that advanced knowledge of feedback availability during manual tracking does not influence tracking accuracy.
Raquel Brown

Department of Biological Sciences

Rhox Gene Expression during the Ovarian Cycle

Mammalian ovulation is a complex, hormone-dependent developmental program in which several events must take place in an ordered progression to ensure that the oocyte is competent for fertilization. This process requires the coordinated expression of many genes which must be turned on and off in the right place at the right time for proper development of the follicle. While the hormone signals from the brain that initiate ovulation are known, the master control genes which regulate this process are not well known. Homeobox proteins are potential candidates to perform as master regulators. Homeobox proteins are DNA-binding proteins that regulate the transcription of downstream genes and thereby control biological events. We recently identified a new homeobox gene cluster on the mouse X chromosome that is only expressed in reproductive tissues. These reproductive homeobox (Rhox) genes are expressed in the ovary, placenta, testis, and epididymis, and thus are good candidates to regulate both male and female reproductive tissue development and physiology. In this project, we investigated the expression patterns of the Rhox cluster during ovulation using a PMSG primed, hCG induced superovulation model. Rhox gene expression fell into three categories: Class I exhibited peak expression prior to ovulation (0-8 hours after hCG), Class II were predominantly expressed during ovulation (8-16 hours after hCG), and Class III peaked after ovulation. The slightly overlapping windows of peak Rhox gene expression suggest that these genes may regulate specific events during the ovulatory cycle.

Elora Voyles and Marybeth Hentrich

Department of Psychology

Effects of Distraction 2

Our study looked at the relationship between distraction and task completion. It was hypothesized that a distracter could have an impact to negatively affect the completion of a given task. College students from an introductory psychology class and students from a 211 psychology class at Southern Illinois University, Carbondale (N=33) were asked to complete a word find in fifteen minutes. Half of the participants were exposed to an experimental condition with a confederate distracter among the students (i.e. talking on her cell phone, getting up from her seat, and talking to other participants). The other group of participants was not exposed to any form of intended distraction. After the fifteen minutes were up, the participants were asked to complete a short survey about distraction. As expected, results supported the hypothesis that students presented with a distracter did worse on the completion of the word find than students who were not presented with a distracter. This study gives us a good indication that the presence of a distraction can negatively influence our ability to complete tasks.
The Validation of the Trauma Symptom Checklist (TSC-40)

Trauma exposure plays a significant role in the future psychological functioning and well-being of its victims (e.g., Briere & Runtz, 1989). This influence is often a negative one, leading to various problems in both childhood and adulthood (Briere, 1992). Due to this, multiple measures have been developed to assess the impact of trauma and its consequences. Because such emphasis is placed on the accuracy of these instruments, steps to assure the reliability and validity of the instruments is necessary. The present study assesses the psychometric properties of the Trauma Symptom Checklist-40 (TSC-40; Elliot & Briere, 1992) in a sample of college students from a large Midwestern university. All participants filled out the TSC-40, along with other instruments of trauma and anxiety, in an attempt to further validate the TSC-40. It is hypothesized that the scores reported on the Brief Trauma Questionnaire (BTQ; Schnurr, Vielhauer, Weathers, & Findler, 1999), as well as the other measures of trauma, will correlate high with the scores reported on the TSC-40.

Assessment of College Students’ Food Choices when Comparing Their Home Choices to the College Campus Choices

College students have a variety of eating habits and college campus dining halls play a major part in students’ dietary choices. Eating habits may change drastically during students’ transition from home to on-campus living. The purpose of this study is to assess the changes in food choices that students report when transitioning from home to a college campus. The 70 subjects were recruited from all of the University Hall residents that ate in the dining hall during the summer of 2008. These participants were entered into a drawing to win a gift card. The data was analyzed using SPSS (Statistical Package for the Social Sciences 16.0). Of the 70 subjects who completed the questionnaire, 85% reported a change in their eating habits since they came to college. A lot of different factors affect college students’ eating habits which show a need for nutrition education and research programs for college students.
College students are faced with many distractions on a daily basis. The ability to find a place to study, free from distractions, can be challenging. Music is often chosen as a means to eliminate other distractions. This study tested the relationship between music and reading comprehension. College students from a Midwest university (n = 40) were asked to complete a reading comprehension exam. The participants were randomly assigned and separated into two groups. Both groups read a standardized reading passage while listening to music. The experimental group listened to music with lyrics and the control group listened to the exact same song without lyrics. The participants then took a reading comprehension test based on the previously read passage. It was hypothesized that reading comprehension would be greater in subjects who listen to music without lyrics than those who listen to music with lyrics. An independent samples t-test was conducted where equal variances are assumed. The independent samples t-test, t(38)=1.59, p=.121, d=.51, found there to be no statistical significance. The Cohen’s d calculation of .51, however, found there were a moderate amount of differences in the scores between the groups. Subjects in the group with lyrics did have a harder time concentrating. The results indicated a possibility that the lyrical component of a song is more distracting. Mundane realism is prevalent in this study which makes research in this area important especially since music is fully integrated into the lives of students. With more power, the findings of this study would, more than likely, have been statistically significant. Research into this area, with more participants, could prove to be extremely valuable in the future.
Kandace Vallejo

Department of History

Perceptions and Reflections of Democracy: A Qualitative Study

Much literature exists about democracy: what it is and how citizenship might be cultivated in a democracy. Many scholars have critiqued current trends in citizenship education, especially the limited ways in which it is conceptualized, often as little more than voting. While we teach students about the procedural aspects of democracy in schools, we don't know much about how they make meaning of democracy in their everyday lives. There is a gap in the literature about what exactly students are learning and internalizing about democracy. Critical scholars suggest that students are only learning a weak and/or thin vision of democracy, yet perhaps a richer understanding of democracy is being taught than the literature indicates. This study begins to address some of these gaps by adding the voices of College of Education majors on their understandings of democracy to the literature. This study involved seven semi-structured interviews, guided by one overriding research question: what are students learning about democracy and from where? My findings indicated that students are not learning rich understandings of democracy and were unable to differentiate between the United States' political and economic systems.

Joshua Chin, Eric Greenlee, Dr. Matthew Schlesinger

Department of Psychology

Intermittent Vision Restores the Speed-Accuracy Tradeoff during Memory-Guided Tracking

Previous work in our lab has revealed an unexpected relation between tracking accuracy, target speed, and target visibility. In particular, tracking is more accurate for slow targets than for fast ones, when the target is visible (i.e., the speed-accuracy tradeoff). However, this pattern reverses when the target is occluded. In the current study, we hypothesized that providing brief visual samples of the occluded target would enhance memory for its location, and thereby restore the speed-accuracy tradeoff. Specifically, participants tracked moving targets under three vision conditions: (1) a visible target, (2) an occluded target, and (3) intermittent vision, during which an occluded target was briefly flashed during occlusion. Two major results emerged. First, tracking in the visible and occluded conditions replicated our early findings. Second, and more importantly, we found that intermittent vision of the occluded target restored the speed-accuracy tradeoff: participants in this condition were more accurate at tracking the slow target than the fast one. We highlight the implications of these findings for research in visual memory and motor skill.
C. Grant Cox, III  
School of Art and Design  
*Recycled - Repurposed - Revalued*

This study investigates the use of recycled materials by using two art styles: assemblage and abstraction. Assemblage is the construction of recycled objects, and abstraction is the distortion of representational accuracy. Discarded elements found alongside major highways and around dumpsters were collected and then reconstructed. The collected material was assembled in a composition of elements representing human past experiences, meaning items that individuals have once owned and now have discarded. Assemblage, abstract forms, and theory were used to transform each discarded piece into a work of art. Three art pieces have been created from the discarded items, which were transformed from recycled items to items that have new purpose and value.

Philip Anton, Amy Eggemeyer, Brian Thoole, Angela Cress, Michael Doud, & Allison Jurgens  
Department of Kinesiology  
*Combination Nutrition and Exercise Program for Cancer Survivors*

The purpose of this study was to determine if additional physical/QOL benefits may be achieved in cancer survivors via combination dietary modification/exercise vs. exercise alone and usual care. Group 1 (G1) participated in a 12-week intervention that included two one-hour sessions of exercise training (flexibility, balance, resistance, aerobic) per week plus a weekly 40 minute group dietary informational session (this group also tracked a variety of dietary variables). Group 2 (G2) participated in the exercise program, but not the nutrition intervention. Group 3 (G3) received usual care for their cancer, but participated in no structured exercise or nutrition intervention. All subjects were tested pre and post on fatigue and QOL status, as well as several physical tasks. All subjects completed a nutritional habits survey, pre and post. Repeated-measures ANOVA was used to analyze the data (.05 level of significance).

G1 reported increased consumption of fruits/vegetables, calcium, and fiber (p=.045). G2 and G3 reported no significant changes in diet. G1 and G2 improved significantly on treadmill walking (G1: 38%, p = .011; G2: 19%, p = .048), lift/carry (G1: -47%, p = .018; G2: -24%, p = .044), and sit to stand (G1: -20%, p = .046; G2: -31%, p = .022). G1 improved on fatigue (-27%, p = .023) and QOL (24%, p = .029), while G2 did not experience any significant changes in these variables or stair climb/descent (trend toward improvement). G3 had no significant change in any of the physical tasks (trend toward decline), but experienced a decline in QOL (-33%, p=.039) and an increase in fatigue (31%; p=.027). In conclusion, both G1 and G2 improved during the course of the study, but it appears that a nutrition intervention given in conjunction with exercise may offer additional benefit for cancer survivors.
Laura Lyn Sullivan

Department of Psychology

Increased Rejection Sensitivity in Maltreated Children

Rejection Sensitivity refers to one’s expectation of rejection in situations that pose the possibility of rejection. This study examined rejection sensitivity in children who have experienced physical, sexual, emotional abuse or neglect. Participants were asked to complete three surveys and a demographic form: the Emotional and Physical Abuse Questionnaire, Russell’s Sexual Abuse Survey and the Rejection Sensitivity Questionnaire and were grouped into categories, male or female, and maltreatment present or no maltreatment. The data will be analyzed using both 2 x 2 ANOVA and regression. Preliminary analysis of results will be presented. Levels of rejection sensitivity are expected to be higher in those who have a history of abuse than in the non-abused peer control group.

Andrew Dennhardt

Department of Zoology

Ultraviolet radiation perception in nocturnal raptor species: recommendations for future studies

It has been shown in two diurnal raptor species, the European Kestrel (Falco tinnunculus) and the Rough-legged Buzzard (Buteo lagopus), that ultraviolet (UV) radiation can be used as a visual cue to assess the relative availability of prey in an area, during foraging activity. Similar experiments have been attempted using nocturnal raptors as test subjects; however, few UV perception experiments with nocturnal raptors have been undertaken. Prey item fecal matter has a significant amount of reflectance in ultraviolet light and diurnal raptors take advantage of this visual cue to judge where to spend time foraging. Using red fox (Vulpes vulpes) urine as a surrogate for typical prey item fecal matter (that of voles [Microtus multiscp.], mice [Mus multiscp. and Peromyscus multiscp.], etc), the potential for ultraviolet radiation perception in great horned owls (Bubo virginianus) and barred owls (Strix varia) was tested in this experiment. I set up a paired chemical treatment (control and experimental) between 10 different plots, of varying ecological succession stages, to record the amount of visits by the owls to each plot. Relying on the monthly full moon phases for UV light distribution at night, wildlife cameras were used to document owl appearances in the plot zones. Due to inclement weather conditions during all four designated observation periods, chemical treatments were compromised along with the data and results of the project itself. Recommendations for future UV studies will be presented in response to the outcomes of this field experiment.
Justin Dewey and Dr. David Gibson

Department of Plant Biology

A competition study between the rare forest grass Porter’s Reed Grass (Calamagrostis porteri ssp insperata) and the invasive Garlic Mustard (Alliaria petiolata)

Porter’s Reed Grass Calamagrostis porteri ssp insperata is a rare forest grass consisting of approximately 80 populations in 5 states: Illinois, Indiana, Kentucky, Missouri, and Ohio and is listed as threatened or endangered in these states. Garlic Mustard (Alliaria petiolata) is a highly invasive biennial herb in the mustard family that is native to large portions of Europe.

The objectives of this study were to see how the three populations of Porter’s Reed Grass from Illinois would grow in competition with Garlic Mustard. Due to Porter’s Reed Grass’ limited distribution and habitat range, it has not yet come in contact with Garlic Mustard in the wild. Garlic Mustard produces allelochemicals that have been found to kill beneficial mycorrhizal fungi commonly found on the roots of plants in deciduous forests, including Porter’s Reed Grass. The hypothesis for the experiment was that Porter’s Reed Grass would suffer reduced growth when competing with Garlic Mustard, compared to the grass grown alone. Also, it was predicted that there would be differences in how each of three population sources of Porter’s Reed Grass would respond to competition with Garlic Mustard.

Porter’s Reed Grass and Garlic Mustard were grown together in pots in a greenhouse with equal numbers of Porter’s Reed Grass and Garlic Mustard also grown alone to act as controls. At three week intervals the number of leaves and tillers on the Porter’s Reed Grass were recorded, and the numbers of leaves on the Garlic Mustard were counted and leaf height and width measurements were taken and averaged for each individual plant. These data indicated that the Garlic Mustard plants grown in competition with Porter’s Reed Grass produced fewer leaves than when grown alone. Also, the growth of Porter’s Reed Grass differed between populations when growing in competition with Garlic Mustard.

Shanna Strieker, Dr. Jodi Huggenvik, Dr. Michael Collard

Department of Physiology

Measurement of Altered Gene Expression in Human Cancer Cell Lines Over-expressing an Anti-sense RNA to DEAF-1

Deformed Epidermal Autoregulatory Factor-1 (DEAF-1) gene in humans is located on chromosome 11 in a region 11p15.5 that is known to harbor multiple tumor suppressor genes. DEAF-1 Antisense Transcript 1 (DAS-1) is expressed from the antisense strand of the DEAF-1 gene. Studies have indicated that antisense RNA transcripts can play roles in gene regulation; however, DAS-1 was found not to affect the expression of the DEAF-1 gene. To examine if other genes are potentially regulated by DAS-1 expression, a human rhabdomyosarcoma cell (RD) line was stably transfected with DAS-1. The RD cell line was chosen because it has undergone loss of heterozygosity at 11p15.5, which makes it an appropriate experimental model to study tumor suppressors in this region. Overexpression of DEAF-1 antisense transcripts produced a noticeable change in the phenotype of the cell line. Microarrays were performed to determine if there were any particular genes regulated by DAS-1 by comparing gene expression patterns in cell lines overexpressing DAS-1 versus cell lines with reduced DAS-1 expression. Microarrays have revealed that hundreds of genes may be differentially expressed. The most statistically significant candidate genes were chosen for further analysis by real-time PCR for quantitation of RNA levels. Real-time PCR confirmed that mRNA for G0S2, a gene associated with the cell cycle, was down regulated up to one-hundred-fold in DAS-1 overexpressing RD cells and Glypican 3, a gene associated with glucose transport, appears to be up-regulated. Future studies will investigate the mechanism of how these antisense transcripts affect gene expression.
Jamie Sexton  
School of Architecture  

*Steamboats Built at Metropolis, Illinois*

The purpose of this project is to present research on not only why boats were built in Metropolis and which and what kinds of boats were built, but also on the people that designed and built these boats. Much of the reason why boats were constructed in Metropolis and not somewhere such as Cairo is due to the rivers and railroads that headed through it. Metropolis was more easily accessible to the hardwoods that were necessary for the construction of these boats via the Cumberland and Tennessee Rivers. Some other questions are posed as well. Did the Civil War have anything to do with it? Where did the people that built these boats come from? What made it happen in the first place? Who were the designers of these boats? The *Keokuk*, was the first boat built in Metropolis. It was completed in 1855 and was the only boat of that decade to be built. In the 1860s’ 15 Packetboats were built – 8 ended up being finished in St. Louis. The 1860s marks the beginning of building sternwheelers for the “towing” (pushing) of barges that were also part of the boat-building industry. A collection of the research will be compiled into a booklet of timelines, photographs, and other documentation.

Garcia Dunning & Dr. Rebecca Weston  
Department of Psychology  

*Race/Ethnicity Moderates the Association of Religiosity and PTSD Symptoms*

This study examined the relationship between religiosity and Post Traumatic Stress Disorder (PTSD) symptoms. Specifically, the hypothesis that greater religiosity is associated with lower PTSD symptomology was tested. Further, a hypothesized moderating effect of race/ethnicity was tested. Higher levels of religiosity were expected to be more strongly associated with lower levels of PTSD symptoms in African-American women than among Euro-American or Mexican-American women. These predictions were examined in a sample of 835 women from the Dallas metropolitan area who participated in a multiwave longitudinal study, Project HOW: Health Outcomes of Women. The women self-identified as African-American (*n* = 302), non-Hispanic Euro-American (*n* = 273), and Mexican-American (*n* = 260). The Crime Related PTSD scale (Saunders, Arata, & Kirkpatrick, 1990) assessed PTSD symptoms. Religiosity was measured with items of self-rated influence of religion in the participant’s life. The questions included frequency ratings of church attendance, prayer and importance of religion based on Neff and Hoppe’s (1993) scale. Results of this study indicated that religiosity predicts lower PTSD symptoms only among Mexican American women, and that frequency of church attendance, specifically, explained 4.9% of variance in PTSD symptoms. Implications of the results’ relevance of religiosity in PTSD symptom assessment and treatment will be discussed.
Creating a Campus Sustainability Plan: Development Processes, Structures, and Strategies

Colleges and universities are quickly recognizing the critical role they play in the progression toward a sustainable society both in how they operate and educate. Though they have a rich history in environmental leadership, it has not been until the past decade that universities began developing a comprehensive approach to sustainability by developing campus-wide sustainability plans. How are plans developed? How are plans structured? What strategies are employed within the plans to achieve campus sustainability? To answer these questions, I reviewed seven sustainability plans from colleges and universities across the country focusing my analysis on plan development process, structure, and implementation strategies. Results show that wide participation from students, faculty, and staff is exemplary. The average number of participants involved in the planning process totaled 50. Planning is typically steered by an ad-hoc or standing sustainability committee and broken down into anywhere between six and 17 specific areas such as energy, water, waste, transportation, built environment, grounds, academics, etc. Indicators or metrics are often identified to track progress in each area. Other trends include high levels of student involvement in planning and data acquisition, the desire to serve as a working model of sustainability and prepare students to create a more sustainable society, use of existing standards (e.g., LEED, T.A.B.S-21, Green Seal, Energy Star, etc.), a lack of good area specific data, recognizing the social, financial, and ecological benefits of sustainability planning, academic and extracurricular sustainability education, and emphasis on conservation and efficiency in the energy sector. Differences predominantly involved varying levels of ambition and detail. While some plans aspired to achieve zero-waste or climate neutrality, for instance, others simply called for modest waste and energy use reductions. Furthermore, the steps to achieve goals outlined in each plan were either detailed, enumerating specific action steps and timelines for achievement, or vague lofty articulations without detailed implementation steps or timelines.

Mame Redwood¹, Erin Palmer², Jane Geisler-Lee¹

Department of Plant Biology¹ and Department of Arts & Design²

Artistic and Biological Illustrations of Fern Life Cycles

Biological processes can be confusing to students. One especially difficult concept is the fern life cycle, which exhibits stages of development not present in animals. Fern spores germinate into free-living, multicellular, haploid individuals called gametophytes that unlike animals or seed plants live independently of sporophytes. I clearly display these stages of the fern in a 3-D manner, and illustrate them richly to generate the interest of the student. This project is intended to involve the common ground of two different fields, art and biology, in a way that will engage and educate members of both disciplines, and the general public.

Biologically accurate and informative fern life cycles are illustrated beautifully and richly on ceramic plates. The natural material of clay is suited for the depiction of fern life cycles because the plasticity of the medium allows for the rendering of supple organic form. However, unlike most fluid materials which are ephemeral in nature, clay can be dried and heated to high temperatures, which melts the clay particles together and fixes the fluid form into a sturdy, permanent object. Clay is also suited for depiction of natural forms and processes because the clay is colored and decorated in natural earth tones derived from minerals applied to the clay surface.

The content of the work will interest members of the scientific community who otherwise may not be interested in art. The beautiful rendering of processes usually shown in diagrams and line drawings will interest the general public, who may stop to appreciate an attractive piece of artwork more readily than a stark diagram. Furthermore, the aesthetic qualities and craftsmanship of the pieces engages the artist, who has much to learn from the beauty, complexity, and grace of organic form.
Jane Pivovarnik & Dr. Laura Kidd

School of Architecture/Fashion Design & Merchandising Program

Undressing the Past: An Inside-Out Look at Women’s Historical Costume during the Rococo

Most university historic costume collections are utilized as teaching aids in historic costume courses, as garments are visible instructors in current silhouettes, embellishments, undergarments and accessories that are representative of specific eras. Unfortunately, many collections do not have actual garments from early time periods, such as the rococo. Although historic costume texts include photos, paintings and diagrams, many students find it difficult to fully visualize the three-dimensional. In order to create a teaching aid to help students understand rococo fashion, the objective of this project was to create a half-scale model of a woman’s 1770 undergarments and costume for use as an instructional aide in the study of historic fashion and costume. The half-scale patterns for the undergarments and the gown were developed from Margot Hamilton Hill and Peter A. Bucknell’s The Evolution of Fashion: Pattern and Cut from 1066 to 1930. Additional research into fabrications, silhouettes and trims was done using photographs of 1770’s gowns currently housed in museum collections, paintings from the era, and tailors’ diagrams of French and English gowns. Draping and flat pattern techniques were used to develop the undergarments (corset, panniers and petticoat) and the gown. Fabric manipulations from the rococo era, such as ruching and smocking, were recreated in scale and were used to embellish the gown in typical rococo style. To add to the value as an instructional tool, two sets of the undergarments, the corset, the pannier, and the petticoat, were made, so that when displayed, students can see the undergarments and understand the contribution they make to the final silhouette of the gown.

Kimberly Fair1, Matt Geisler2, Jane Geisler-Lee2

Department of Physiology1 and Department of Plant Biology2

Identifying Cytochrome P450 Genes Involved in the Pathway of Suberin Biosynthesis in Arabidopsis thaliana through Phylogenetic Analysis and Domain Comparison

Suberin is a strong protective barrier surrounding vascular tissue in the root endodermis; the endodermis regulates water flow from the cortex to the vascular cylinder. It also regulates the amount of water and nutrients that are absorbed by the roots. Suberin also acts as a protective layer that prevents wounding and pathogen invasion. Since many plants live in various environments, some in challenging conditions, the amount of suberin can be adjusted according to what stresses the plant is under. Another interesting feature of suberin is its impermeability to water; this quality makes suberin a potential biopolymer to replace industrial plastic. This quality makes suberin a potential valuable industrial product. Land plants have evolved from aquatic environments and migrated to land; because of this phenomenon there has been a constant quest to understand how land plants acquired protective mechanisms, such as suberin, that assisted in their survival. Despite the usefulness of suberin, little is understood about where suberin comes from and how plants synthesize it. Researchers involved in the analysis of suberized roots have been trying to answer this question. To figure out how land plants make suberin, I have employed phylogenetic analysis and domain comparison to identify genes which may be involved in suberin formation. By using phylogenetic methods, I was able to find other genes related functionally and evolutionarily to genes already known to participate in suberin biosynthesis. I was also able to group the genes according to their domain similarities. By employing phylogenetic analyses and domain comparison, I discovered more genes of Cytochrome P450s that may be involved in suberin biosynthesis in Arabidopsis thaliana.
Heather Foslund, Amanda Harwood, Michael Lydy

Fisheries and Illinois Aquaculture Center and Department of Zoology

Sediment toxicity of pyrethroid insecticides in urban waterways

Previous studies in California and Texas have found elevated pyrethroid insecticide concentrations high enough to cause significant mortality in aquatic invertebrates. Examining the prevalence of pyrethroid insecticides in urban Illinois waterways was conducted because thus far, there have been no studies investigating pesticide runoff into these systems. The objectives of the current study were to examine the prevalence of pyrethroid insecticides in waterways of residential areas throughout Illinois, assess sediment toxicity of those waterways, and determine if pyrethroid insecticides were the primary contributor to the observed toxicity. Twenty sediment samples were collected in waterways of residential neighborhoods throughout Illinois in June 2008 for sediment toxicity testing using the aquatic amphipod, Hyalella azteca as the test organism. Sediments were analyzed for 19 organochlorines, one organophosphate, and eight pyrethroid insecticides. Forty percent of the sediments caused mortality significantly greater than the controls. While both pyrethroid and organochlorine insecticides were commonly detected in the sediments, bifenthrin was identified as the primary source of the toxicity. The current study provides a broad assessment of the prevalence of pesticides in residential developments in Illinois and further supports evidence that residential pyrethroid contamination is a nation-wide problem.

Litney Koch and Amy Phegley

Department of Kinesiology

Physical Variables that Influence Calf Venous Compliance in Young Adults

Compliance of the venous system is described as the slope of the volume-pressure relationship within the vessel. Similar to arterial compliance, increases in venous compliance are associated with a healthier cardiovascular system, but very high compliance may be associated with increased orthostatic hypotension. Aging decreases limb venous compliance and chronic endurance training increases venous compliance. However, we do not know if there are other physical variables that influence calf venous compliance. Therefore, the purpose of this investigation was to determine the extent to which physical variables predict calf venous compliance in young adults. Data for this project were compiled from several studies that assessed calf venous compliance in young adults (n = 40, 20 Female, 20 Male, 22 ± 3 years). Limb venous compliance was assessed non-invasively using venous occlusion plethysmography. The physical variables of height, body mass, body mass index, bodyfat percentage, systolic and diastolic blood pressure, calf volume, and capacitance and capillary filtration volumes were assessed in all participants. VO2 max was assessed using open circuit spirometry during an incremental treadmill test to exhaustion. Physical variables were entered against calf venous compliance using stepwise multiple regression. The physical variables that significantly predicted calf venous compliance include VO2 max, capacitance volume and body mass index (R square = .653; SEE = .00048). In conclusion, variables that are associated with improvements in fitness such as increased functional capacity, higher blood volume and lower body mass index contribute significantly to calf venous compliance.
Aléc Perry

Communication Disorders and Sciences, College of Education and Human Services

Assessment of Cross-Cultural Adaptability of Graduate Students in Communication Disorders and Sciences

As members of a “helping profession” it is essential that we as practitioners are both aware of, and adaptable to, the needs of clients belonging to cultures other than our own. Failure to incorporate cultural considerations into our therapy may lead to poor client outcomes. Therefore, this study utilized the Cross-Cultural Adaptability Inventory (CCAI) to examine the cultural adaptability of 18 continuing graduate students enrolled in the communication disorders and sciences program at Southern Illinois University Carbondale. The CCAI is a culture-general standardized self-assessment instrument used to assess “one’s ability to adapt to any culture,” which consists of 50 items used to measure the cross cultural adaptability of participants on four subscales: emotional resilience, flexibility/openness, perceptual acuity, and personal autonomy. The data was analyzed using SPSS and generated descriptive statistics on the cultural adaptability as it relates to participants’ age, ethnicity, education status and participation in the teacher education program. The overall score of the SIUC participants was lower than the norm group of the CCAI which indicated that they are not as adaptable to cross cultural interactions.

Casie Frink

Department of Psychology

Self-esteem and Internalizing Behaviors in five-year-old children

Self-esteem is an important factor in the development of children. Prior research has shown that children possessing low self-esteem are at risk for problematic internalizing and externalizing behaviors. The absence of a healthy self-esteem puts one at risk for almost any form of disordered behavior, but the current study examines the relationship between self-esteem and internalizing behaviors at age five. The four components of self-esteem that will be measured include perceived peer acceptance, perceived maternal acceptance, perceived cognitive competence, and perceived physical competence. The genetic influence of self-esteem and internalizing behaviors at age five will also be assessed. Participants were five-year-old twins from the Southern Illinois Twins and Siblings Study (SITSS; DiLalla, 2002). The self-esteem ratings were collected from Harter’s Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (Harter, 1984). At the time the five year olds were tested, the parents completed a behavior questionnaire to determine any internalizing behaviors their children were displaying. It is hypothesized that self-esteem will be negatively correlated with internalizing behaviors. It is also hypothesized that self-esteem or internalizing behaviors do not have a significant genetic influence.
Lisa Furby
Department of Mechanical Engineering

Novel Sensor for Measuring Sodium Concentration for Dialysis Applications

One of the critical medical problems facing society today is the growing number of patients diagnosed with End-Stage Renal Disease (ESRD). Patients diagnosed with ESRD often face a problem of limited organ transplantation possibilities and time consuming, cumbersome as well as painstaking treatments that affect patients’ quality of life. This study is part of a larger effort to develop new types of dialysis treatments focused on improving the quality of life of ESRD patients. The focus of this project is the development of a simple, yet reliable sensor that can measure the toxic ion levels in the human body so that the right type and amount of material can be released in the body to absorb these ions. The sensor is based on the change in resistivity of the solution with different ion concentrations. It has been shown that that by using customized plates with different combinations of metals, the voltage readings across different terminals is unique to the concentration of the solution. By using various metal electrodes of different sizes and distances, one can develop a table of values for the ion concentration vs. voltage (actually measuring resistance by keeping track of the current). Such a look-up table can then be used to measure the ion concentration in an unknown solution. This concept will then be extended to solutions containing multiple ions. The key to the success of this approach lies in the formation of the sensing plate that has multiple electrodes of different metals, sizes and distances between them, all which contribute to a distinct and unique pattern for the current concentration of ions in the solution. The two most critical ions are sodium and potassium, and this poster presents results for only the sodium trials to show the feasibility of this approach.

Ryan Perrin
Department of Psychology

Erotic Perceptual Ratings as Mediated by Sociocultural Background

The purpose of this study is to address an apparent lack of definition in the psychological literature with regards to eroticism. Through examination of past research, there seems to be wide and varied views as to what "erotic" means and to what degree certain variables influence a person's perspective on what constitutes something being erotic. As an exploratory study, the researcher will be evaluating the data based on a number of sociocultural variables, gender and a measure of openness to sexual topics known as the Sexual Opinion Survey. Participants were presented with a series of images from the International Affective Picture System (IAPS) of men and/or women, with varying degrees of nudity, which they then ranked in terms of how erotic they appeared to be. We expect that men and women will differ in their ratings and that people from different backgrounds will also evaluate the images differently. We hope to be able to determine a baseline for how a person’s background influences how they view and approach erotic images and inform future research on eroticism.
Elizabeth M. Patterson, Deborah O. Jung, Buffy S. Ellsworth

Department of Physiology

The Role of the Forkhead Transcription Factor, Foxd1, during Pituitary Development

Congenital pituitary hormone deficiencies occur in approximately one out of every 4000 live births, resulting in various pathologies including sex reversal and infertility. Hormone deficiencies that are caused by transcription factor defects tend to be syndromic, accompanied most often by craniofacial abnormalities. Several pituitary transcription factors have been shown to contribute to congenital hormone deficiency, however, these factors do not account for the majority of hormone deficiency cases. A recently discovered family of transcription factors, known as forkhead factors, is essential for diverse developmental processes and is responsible for numerous human developmental disorders. Forkhead transcription factors play a major role in organ development and represent important candidate genes for congenital pituitary diseases. The forkhead transcription factor, Foxd1, is expressed in the mesenchyme surrounding the pituitary during development. This mesenchyme is a source of growth factors, which are essential for normal pituitary development. Therefore, we hypothesize that Foxd1 is important for production of these growth factors and ultimately for normal pituitary development. To determine the role of Foxd1 in pituitary development, we analyzed the pituitary phenotype of Foxd1 knockout mice (Foxd1\textsuperscript{-/-}). Pituitary morphology is normal in Foxd1\textsuperscript{-/-} mouse embryos at e14.5 and e18.5; however, preliminary results suggest that pituitary development may be delayed at e10.5. Expression of the anterior pituitary hormones, adrenocorticotropic hormone (ACTH), luteinizing hormone β (LHβ), α-glycoprotein hormone subunit (αGSU), and thyroid-stimulating hormone β (TSHβ) are normal in Foxd1\textsuperscript{-/-} mouse embryos at e18.5. Steroidogenic factor 1 (SF1), a transcription factor that is required for normal pituitary development, is expressed normally at e14.5 in Foxd1\textsuperscript{-/-} mouse embryos, as is ACTH. In light of these data, we conclude that Foxd1 may be important for early events of pituitary formation, but not for events after e14.5.

Jonáté Govan

Department of Health Education

Understanding Binge Drinking Among Football Players at a Midwestern IAA University

Numerous studies have been conducted to find out why college students frequently consume high levels of alcohol and what health educators can do to address this issue. However, only a few studies have been done to examine this issue within the athletic community. This qualitative study investigates the relationship between college football players and binge drinking. The participants consisted of eight football players at a division IAA Midwestern University. Each participant took part in an independent semi-structured interview protocol by answering a series of open ended questions. The data was transcribed and then the contexts were analyzed by coding common themes and making contrasts and comparisons. The findings indicated that the athletes’ higher rates of binge drinking are because of their isolated social environment.
Alicia Kristin Guebert

School of Art & Design, Department of Art History

The Creole House: Research, Preservation, and Interpretation of a Historic Home in Prairie du Rocher, Illinois

The Creole House is a French home located in Prairie du Rocher, Illinois. This historic home, built around 1800, boasts a rich history and houses a small but significant collection that includes oil and enamel portraits, French and English porcelain, period furniture, and numerous photographs and daguerreotypes. The history of the house includes wealth, society, lotteries, tragedy, public officials, and affluent people who contributed to the growth of Prairie du Rocher. The Creole House is just one of several historic sites in Randolph County that provides a critical link to the beginning of European settlement in southern Illinois. After undergoing a massive restoration project in 1977, the Creole House began falling into disrepair and out of public interest by the mid-1990s. This multi-phase research and community service project aims to restore the cultural legitimacy of the Creole House in an area defined by its heritage through research, preservation, and interpretation. All of this is done in an effort to increase community awareness and involvement with the site.

The research phase of this project was begun in early 2007 and has focused on the collections for which there was previously no research, nineteenth-century portraiture, and nineteenth-century bourgeois society, ideologies, and gender roles. The preservation phase began with the availability of REACH funds in which archival materials were purchased; this phase continues as new conservation issues emerge. Interpretation of the house and its objects is the current focus of this project and will continue with the assimilation of new docent guides, self-guided tour materials, and supplemental materials. The Creole House will be reintroduced to the public during the summer Rendezvous at nearby Fort de Chartres, an event that draws thousands of re-enactors and tourists annually.

Sarah Owusu

Department of Physiology

Expression of foxd1 in the pituitary during embryonic development

The pituitary is an endocrine gland the size of a pea, located beneath the brain, consisting of the anterior, intermediate, and posterior lobes. In spite of this gland being small in size, its role is significant. The pituitary gland is responsible for making hormones that control other endocrine glands. The anterior lobe is responsible for controlling the adrenal, reproductive, mammary, and thyroid glands by producing growth hormone, adrenocorticotrophic hormone, thyroid-stimulating hormone, gonadotropins, and prolactin. Forkhead transcription factors are important for organ development. RT-PCR results suggest that the forkhead factor, Foxd1, is expressed in both adult male and female mouse pituitary and in the developing pituitary at e12.5 and e18.5 (12.5 and 18.5 embryonic days after conception). We have detected expression of the forkhead transcription factor, Foxd1, in the mesenchyme, ventral diencephalon, and tissue surrounding the pituitary in mice at e12.5, e14.5, and e16.5 by examining β-galactosidase staining of embryos at those ages, but not in the pituitary gland itself. We detect Foxd1 expression in the pituitary 10 days after birth (P10) and in the adult. Immunohistochemistry results suggest that thyrotrpoe, gonadotrope, and corticotrope pituitary cell types do not express Foxd1. Knowing when and where the Foxd1 gene is expressed will help us understand the function of FOXD1 protein in the pituitary gland. These studies will provide information to treat and hopefully prevent pituitary defects.
Amber Owens, Amber N. Hurley, and Bakul C. Dave
Department of Chemistry and Biochemistry

*Enzyme-Regulated Release from Organosilica Sol-Gel Materials*

This presentation will focus on the use of porous sol-gel glasses in controlled release applications. Sol gels are silica-based glasses that are prepared using the room temperature sol-gel pathway. In this study, it is shown that hybrid sol-gel materials made from TEOS and APTES precursors are able to undergo volume changes in response to variation in pH of the external medium and this feature can be exploited in controlled release applications. This concept was evaluated using colored dye molecules as model systems for controlled release from the glasses. The colored dyes can be easily monitored by means of optical spectroscopy. The gels, when exposed to an acidic pH, exhibit faster release of encapsulated dyes. The pH dependent release was studied using two dyes: Phenol Red (PR) and Phenosafranin (PS), which have different charges that can also be varied as a function of pH. The results show that the rate of release of the two dyes can be easily altered and modulated by exposing the gels to either NaOH or HCl to make the external environment basic or acidic. An additional aspect of this work was to design an enzyme-based controlled release system with the enzyme glucose oxidase which when exposed to glucose generates gluconic acid and changes the internal pH of the gel. The results show a faster release of the encapsulated dyes when exposed to a glucose solution. This feature may find potential applications in glucose-regulated release of drugs and other therapeutics for the treatment of diabetes. Finally, the general utility of sol-gels as vehicles by tailoring their composition in combination with an external trigger mechanism for controlled release will be presented. The results obtained as part of this work provide an initial evidence of the feasibility of using organosilica glasses in controlled release and delivery of different molecules based on varying their interactions with the glasses.

Robert Ham¹ and Aldwin Anterola²
Department of Physiology¹ and Department of Plant Biology²

*Production of two Taxol precursors in the moss Physcomitrella patens*

Taxol is the most promising anticancer drug on the market today. It is used for a variety of cancers, including breast, prostate and lung cancers. The problem lies in its availability. It is currently produced from Pacific and European yew trees that produce variable amounts of the drug. Synthetic methods, as well as other biosynthetic systems, have also been explored, although each model has presented its own limitations. The moss Physcomitrella patens appears to be a promising model. It naturally produces a diterpene compound which has already been genetically modified to produce taxadiene. The goal of this project is to convert taxadiene in the transgenic moss into taxadiene-5-ol, which is a more advanced precursor of Taxol. First, the gene encoding the enzyme taxadiene-5-hydroxylase was amplified by polymerase chain reaction (PCR), and transformed into E. coli using plasmid vectors. Its presence was verified by PCR and gel analysis. The recombinant DNA was then isolated from the bacteria and transformed into the moss P. patens. Taxadiene-5-ol produced by the moss will be verified using gas chromatography-mass spectrometry. A pathway producing Taxol precursors in moss will provide a much cheaper alternative than methods currently in use, and therefore will make Taxol accessible to more people in need.
April Harrison¹, Ashley Kaytor¹, Karla Gage¹, David Gibson¹, and Bryan Young²

Department of Plant Biology¹ and Department of Plant, Soil and Agricultural Systems²

Differences in reproduction in glyphosate-resistant (GR) and -susceptible (GS) populations of Conyza canadensis L. Cronq. (Asteraceae)

Conyza canadensis (marestail) is a competitive weed of agricultural crops and disturbed habitats. It has been found to reduce crop yields by up to 83%. Many biotypes of this weed have developed resistance to glyphosate, the world’s best selling herbicide. These resistant plants may show decreased levels of reproduction compared with susceptible plants if there is an energetic cost associated with resistance. This experiment seeks to identify reproductive differences between glyphosate-resistant (GR) and glyphosate-susceptible (GS) plants. Our study also tests the effects of shading and competition, thereby investigating both abiotic and biotic influences. Seed from two populations of resistant plants (R1 and R2) and two populations of susceptible plants (S1 and S2) were obtained. A seedling from one of the populations (the target plant) was placed in a pot alone or with a competitor of the same or a different population; five blocks of pots were shaded, and five were not shaded. We counted capitula for the target plant in each pot as a measure of reproduction (fecundity). We found a significant interaction between target population and competitor population on number of capitula. Analysis of effects of competitor population suggested targets were able to produce more capitula when planted alone or with R2. Reproductive differences between target plants did not indicate lower reproduction associated with resistance. Our results suggest reproduction and perhaps population growth rates of GR and GS plants may be equal in the absence of glyphosate.

Steve Middleton

Department of Kinesiology

Non-Traumatic Testicular Pain in a College Weightlifter

Testicular pain of acute onset is typically separated into three diagnoses: trauma, torsion or epididymitis which may or may not be secondary to a sexually transmitted disease. Presented is the case of a 29 year old weight-lifter who presented with acute onset right testicular pain. He had associated symptoms including nausea, increased urination, urethral discharge and a sense of the involved testicle feeling heavy that seemed to point to epididymitis. After unsuccessfully being treated with multiple regimens of antibiotics and non-steroidal anti-inflammatories, other symptoms began to develop including ipsilateral lumbar and abdominal pain that radiated posteriorly to the arch of his right foot. It was determined that an upsip of his right sacroiliac joint was compressing the second sacral nerve resulting in his symptoms. While traditional physical therapy consisting of lumbar stabilization and muscle energy techniques were also unsuccessful, he finally obtained relief through osteopathic manipulations and was able to return to weight lifting and running.
An Analysis of Illinois Plant Species and their Association with Perchlorate Reducing Bacteria

Perchlorate contamination became a serious environmental concern after its links between human exposure and abnormal thyroid function. The most cost-effective alternative to the removal of perchlorate from the environment is with dissimilatory perchlorate-reducing bacteria (DPRB). The main objective of this project was to determine which native Illinois plant species, and environmental factors, best stimulated the growth of DPRB. The perchlorate contaminated soils were obtained from Crab Orchard Wildlife Refuge. The native plant species selected were: *Typha angustifolia* (narrowleaf cattail), *Phragmites communis* (common reed), *Scirpus acutus* (hardstem bulrush), *Amorpha fruticosa* (false indigo), hybrid poplar, and Redosier dogwood. The plants species were incubated at 85 degrees Fahrenheit and watered with 500ml of 1000ppb perchlorate twice a week for two months. At this point the plants were sacrificed and analyzed. Following a 16S rDNA PCR, the sequences were cloned into an *Escherichia coli* TOPO cloning vector and sent off for sequencing. The sequencing analysis revealed *Amorpha fruticosa* as having the greatest bacterial diversity. It is likely that this plant species will contain the most DPRB diversity. Perchlorate reducers were detected using a nested primer set that identifies the *eld* gene. The *eld* gene was found in all six plant species. After a DGGE analysis, it will be possible to determine which plant species has the greatest DPRB diversity. This plant species, along with the perchlorate contaminated soils, will be grown under the same parameters as above with varying environmental conditions, such as temperatures and pH. These results will indicate how temperature and pH affect DPRB diversity.

Sarah Heck

Department of Psychology

*McTBI: Does a fast food diet worsen behavioral outcome following traumatic brain injury?*

Traumatic brain injury (TBI) is a major public health issue affecting 1.4 million Americans each year, of which approximately 50,000 Americans die annually. High-fat sucrose (HFS) diets are another public health issue which can lead to obesity, hypertension, and many other debilitating disorders. These two disorders combined can lead to more complicated issues. It has recently been shown that HFS diets can reduce levels of brain-derived neurotrophic factor (BDNF) leading to reductions in neuronal and behavioral plasticity. This reduction in BDNF is suspected of increasing the susceptibility to brain insults following TBI. To test the effects of a HFS diet on a TBI recipient, 21 male Sprague-Dawley rats were used in this study. Eight weeks prior to TBI, rats were placed on a special HFS diet (n=11) or a standard rodent diet (n=10). Following this eight week period, rats were prepared with bilateral frontal cortical contusion injuries or sham (non-injury, control condition) injuries. Beginning day 2 post-TBI animals were tested on a battery of behavioral tests. Somatosensory dysfunction was tested with the bilateral tactile adhesive test on days 2, 4, 6, 10, 14, and 18 post-TBI. Acquisition of memory was tested in the Morris water maze, with a reference memory task performed on days 11, 12, 13, and 14 and a working memory task performed on days 15, 16, and 17 post-TBI. Twenty-one days following TBI animals were transcardially perfused, their brains processed and sectioned, and the sections were stained with cresyl violet for lesion analysis. Preliminary analysis of the data revealed that the animals on the standard diet had a greater improvement in somatosensory performance compared to animals on the HFS diet. Also, the standard diet animals appeared to have less memory impairments on the reference memory Morris water maze task compared to HFS diet animals. However, no improvements were noted on the working memory Morris water maze task and lesion cavity sizes appeared to be statistically similar between groups.
Roughly 40% of boreal western Canada is composed of peatlands, ecosystems that have soils rich in carbon. Much of this area is also the location of oil-sand deposits. In order to extract this oil, oil companies construct pads of highly compacted mineral soil (averaging 100 X 100 meters) to support their drilling and production equipment. Once the oil rigs and wells are removed, these highly compacted areas of mineral soil remains. Characteristic of peatlands is their ability to accumulate organic matter faster than it decomposes resulting in sequestration of atmospheric carbon. However, these mineral soils make re-vegetation difficult hindering the ability of the peatland to redevelop. The purpose of this project is aimed to restore decommissioned oil pads to their peatland state by determining the conditions and plants necessary for restoration of the site. In this study, water levels and plant responses are being assessed. At the end of season one, water levels showed three different water treatment levels, wet, mesic, and dry. Plant responses varied to each water treatment level. Wet treatment levels had the highest survival followed by mesic and then dry environmental conditions.
Todd Marlo

Department of Animal Science

Evidence for Locally-Produced Prolactin in Equine Ovaries

Understanding the mechanism controlling seasonal anestrus is of importance to equine breeders. Foals that compete and are born closer to January 1 have an advantage to foals born later in the year. Our lab is currently investigating the role of prolactin during the Fall transition. Circulating prolactin concentrations decline in association with acyclicity. Our aim is to determine if prolactin could be produced locally within the ovary (from non-pituitary sources).

Ten ovaries were collected during summer 2007 for granulosa/theca and luteal tissues samples. Ovaries were collected from light horse mares post mortem. Granulosa/theca (n=20) and luteal samples (n=8) were frozen in liquid nitrogen until further processing. RNA extraction was performed for quantitative polymerase chain reaction analysis using primers and reaction conditions for equine preprolactin as described previously (Clark et al., Dom Anim Endo 24: 367-376). Equine pituitary mRNA was used for the generation of a standard curve. In a second experiment, ovaries were collected from light horse mares in the summer (n=6) and winter (n=5). Immunohistochemistry was performed by fixing tissues in 4% paraformaldehyde, embedded in paraffin and cut into 5 um sections. Tissue sections were incubated with R4 prolactin rabbit anti-porcine antibody (provided by D. Thompson, Louisiana State University) previously shown to detect equine prolactin. The secondary antibody was goat anti-rabbit IgG-biotinylated (avidin-biotin complex) developed with DAB chromagen-Ni and counterstained with nuclear fast red stain.

Equine preprolactin mRNA was detected in all samples. There was no difference in mRNA expression between sample types. There was a correlation in preprolactin concentration in granulosa/theca samples compared to follicle size (P<0.05); granulosa/theca cells from larger follicles had fewer transcripts than smaller follicles. Histological preparations revealed prolactin staining associated with follicular, luteal, and vasculature structures. This evidence supports our hypothesis that prolactin is produced in equine ovaries.

Vernon Johnson

Healthcare Management, School of Allied Health

Communication Breakdown: A Critical Assessment of Type 2 Diabetes Education Efforts Directed Towards African-American Students at a Midwestern University

There is a growing consensus among those within the health care community that more preventive measures should be taken to combat Type 2 Diabetes among African-Americans. In the case of Type 2 Diabetes, the illness is preventable if proper precautions are taken. Most health officials agree that lifestyle factors, such as diet and physical activity, contribute to Type 2 Diabetes. Even though prevention options are readily available, African Americans are reactionary in their method of retrieving information about Type 2 Diabetes, often waiting until their condition becomes unmanageable. Many attribute this mistrust of health care providers to the historical mistreatment of African Americans. Consequently, it is vital for African-Americans to receive Type 2 Diabetes preventive education through various venues, including university and college wellness centers. This project examined several strategies used by the Southern Illinois University-Carbondale Wellness Center and offers recommendations on how to enhance health education programs that target African-American students.
Folding of proteins and other biomolecules is essential for their function and reactivity. Volume-sensitive sol-gels—that undergo reversible changes in their volume when subjected to an external stimulus—provide a means to controlled folding and unfolding of proteins due to dynamic confinement. A modulation of the natural protein conformation can be accomplished that is assisted and facilitated by the artificial sol-gel system due to variable pore volume. This presentation would focus on studies of temperature-regulated folding and unfolding of three heme-proteins: cytochrome c, hemoglobin, and myoglobin. The folding-unfolding dynamics of these proteins can be monitored using a UV-VIS spectrometer due to the presence of heme groups. We show that a confinement of these proteins in the pores of the thermo-responsive sol-gels influences their conformational dynamics such that their structure can be reversibly modulated. The results show that denaturation-renaturation kinetics of proteins in these gels is altered as compared to solution phase. In addition, as part of this work the temperature regulated activity of glucose oxidase was also studied. The changes in porosity of the glasses with respect to changes in temperature provide a means to control reactivity of the enzyme. As such, the reactivity of the enzyme can be altered and modulated by simply changing the external temperature of the system. Recent results on modulating the structure and reactivity of glucose oxidase in these glasses will also be presented.

The purpose of this research project was to measure SIU sports fans’ motivation by using the Motivation Scale for Sport Consumption (MSSC) and the Public-Private Athletic Identity Scale (PPAIS) to better understand segments of their fan base. Trail and James (2001) created the MSSC scale which measures the motivations of the sport fan consumption behavior. In addition to the MSSC, Nasco and Webb’s (2006) Public Private Athletic Identity Scale (PPAIS) was used to measure an individual’s personal athletic identity divided into public and private dimensions. I also included questions to get a better understanding of ticket buyer’s perceptions of SIU sports. Using an online survey posted to the SIU website, I collected data from 766 respondents, 389 male, 112 female and 265 did not respond. Of the respondents, 276 were season ticket holders, 398 were not and 98 did not respond. When comparing the two scales, Private Athletic Identity was significantly and positively correlated with all MSSC subscales. Results indicated the stronger a person identifies their private self-concept as an athlete, the stronger their motivation to consume sports across all 8 factors. In addition, Public Athletic Identity was significantly and positively correlated with the MSSC achievement, knowledge, drama, and escape subscales. I concluded that marketing materials can be targeted to different groups: with males appeal to private athletic identity and emphasize knowledge and aesthetics; and with season ticket holders focus on motivations of family, fun, escape, and physical skills of athletes.
Kevin Loyd

Department of Psychology

The Effects of Self-Generated Versus Externally-Imposed Rules on Human Learning

Research has shown that people who learn with the aid of rules or instructions are often insensitive to changes in the environmental contingencies that maintain their behavior. On the other hand, people who learn without the aid instruction readily adapt to changing conditions. In previous research showing rule-governed insensitivity, instructions were given to participants by the experimenter. In this ongoing research, I am assessing if self-generated rules will also reduce sensitivity to environment-behavior relations. Participants made repeated choices between a progressive interval and fixed interval schedule of point delivery. The progressive schedule initially delivered a point immediately, but the time requirement increased by a fixed amount with each point delivered by the schedule (0, 4, 8, 12-s, etc.). Selection of the fixed interval delivered a point after 60-s and reset the progressive interval to 0-s. In initial conditions, progressive interval step size was 4-s. The optimal response pattern under these contingencies is to choose the progressive schedule five times before selecting the fixed and repeating the pattern. Two participants (Rule Generators) were exposed to these conditions and asked to generate a rule that would describe the best way to earn points. The performances of these participants reached steady state within two to three sessions. The progressive interval step size was then increased to 6-s to assess sensitivity to changes in the contingencies. The performances of these participants readily tracked the changes in the task. Thus, self-generated rules do not appear to reduce sensitivity to changes in reinforcement contingencies. Two other participants (Rule Followers) performed the same task, but each was given an instruction produced by one of the rule generators. Preliminary data suggests that both rule followers may show less sensitivity to changes in the task once stable rule following response patterns have been established.

Merry Lanker

School of Art & Design: Department of Art Education

Art & Literature

The goal of this creative project was to increase elementary students’ knowledge of the connection between fine arts and literature. By reading aloud to one another and creating art based on the selected literature, it was understood that the students would have the opportunity to connect what they read to a visual, art centered component such as painting, collage, or printmaking. Over the course of the project, I met with fifteen children between the ages of 6 and 8 twice a week for 3 months at the Boys and Girls Club of Carbondale. Each time we met, we started our time off with a story. This was then followed by a brief discussion of the book and an art project related in some manner. For example, after reading the children’s classic Where the Wild Things Are by Maurice Sendak, we created monsters using a crayon-watercolor resist. After the children had created a large, diverse collection of artwork, I was able to display it at a final Art Show that was open to the public. This gave the children an opportunity to bring their friends and family to the Boys and Girls Club to see what they had accomplished. It also allowed local community members a chance to experience the final result as well. Overall, the children expressed a great deal of enthusiasm towards the books we read, and were excited to share their artwork with their families and general public.
Antoinette Lettieri

School of Architecture

_Saving Shotgun Houses in Cairo, Illinois_

Cairo, located at the southernmost point of Illinois, was once a thriving town with steamboat traffic, blues musicians, and an array of different styles of architecture. The town suffered from immense economic depression leaving Cairo with empty historic buildings throughout the streets. In order to try and revitalize the town, the community has formed the Cairo VISION 20-20 Committee. SIU School of Architecture, Shawnee Community College, and the Heritage Conservation Network (HCN) have teamed up with this committee to try and help bring financial improvement by creating affordable housing in Cairo. The plan is to rehabilitate and preserve several historic "shotgun" style houses since a large number of them are listed or eligible for the National Register of Historic Places.

The goal for this summer is a two week hands-on workshop hosted by the HCN followed by seven weeks of the Preservation Summer Course to rehabilitate one to two houses. The first house chosen is located on the main road of Cairo which could serve as an office organizing future projects as well as a demonstration house and place for volunteers to stay. Preservation Summer students prepared an Historic Structure Assessment which included dimensioned floor plans, room schedules, and a detailed list of repairs and materials needed for both houses. Cost estimates for students to live while working in Cairo have been developed, and we are searching for funding for both room and board and materials. Tools and equipment may be supplied by Shawnee Community College and students are eligible for community service hours through Saluki Volunteer Corps.

Chasity Love and Lichang Wang

Department of Chemistry and Biochemistry

_The effect of support, ZnO, on the structure and properties of Cu clusters_

The overall objective of my research is to explore new pathways for hydrogen and methanol production from coal gasification. The key ingredient of the project is to find catalysts that can maximize methanol formation and minimize the formation of methane from coal gasification. The starting point of our project is to study the adsorption of small copper (Cu) nanoparticles on the surface of zinc oxide (ZnO) using computational tools based on the density functional theory. Specifically, we have studied the adsorption of small Cu nanoparticles (Cu$_n$) on the surface of zinc oxide. The initial Cu$_n$/ZnO systems were constructed with the help of a visualization program, Accelrys Materials Studios. Different sizes of copper nanoparticles were chosen. The calculations were performed using the Perdew-Burke-Ernzerhof (PBE) functional for the exchange and correlation energies and the Projector Augmented Waves (PAW) method, which is implemented in the Vienna Ab-initio Simulation Package (VASP). The initial bare ZnO surface was obtained through the full relaxation of the bulk ZnO. The initial Cu nanoparticles were obtained from our previous studies. In the calculations, Cu atoms in the nanoparticles as well as the first few layers of ZnO surface were fully relaxed to their ground state. One of such systems is illustrated below. The favorable adsorption site and the size dependence of the adsorption properties were obtained and will be discussed.