



Undergraduate Creative Activities and Research Forum Abstract Booklet

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# 2016 Undergraduate Creative Activities and Research Forum Abstract Booklet

Southern Illinois University Carbondale Center for Undergraduate Research and Creative Activities

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# UNDERGRADUATE CREATIVE ACTIVITIES AND RESEARCH FORUM

## 2016 ABSTRACTS



Student Center  
Ballrooms A, B, C, & D  
April 4<sup>th</sup>, 2016

**SIU**  
CARBONDALE

SOUTHERN ILLINOIS UNIVERSITY

**CENTER FOR UNDERGRADUATE  
RESEARCH & CREATIVE ACTIVITIES**



**“We value undergraduate participation** in research and creative endeavors because it enhances our students’ critical thinking and communication skills, which better prepares them to compete in the global society. Research also stimulates curiosity, which leads of course to answers. I know from my own research when I was a faculty member the excitement of discovering new information, and the satisfaction that comes from sharing those discoveries with others. The commitment of our students and their faculty mentors is an inspiration to all of us.”

—*Randy J. Dunn, SIU System President*

**“Our undergraduates engaged** in research are among our best and most successful students. Research is problem-solving—learning to ask questions and finding out how to answer them. From freshmen to seniors, these students are gaining knowledge and skills, and building collaborative relationships that will propel their lives and careers in every field and provide real advantages in their professional careers. We are very proud of their accomplishments.”

—*Susan M. Ford, Provost and Vice Chancellor for Academic Affairs*

**“Creating new knowledge** is the pulse of SIU. Our students have direct access to renowned faculty and facilities typically found at universities several times our size, leading to accomplishments in diverse places such as the laboratory, studio, and stage. Not only do our students leave SIU with a degree in hand, but also a creative mind. And with hard work and some serendipity, our graduates may also find themselves with a published article, a novel musical score, an unique piece of art, or most importantly, a fresh view of the world. At SIU, all things are within your reach.”

—*James Garvey, Interim Vice Chancellor for Research*

**“‘Know No Bounds’** represents Southern Illinois University Carbondale without a doubt. Participating in undergraduate creative activities and research is a way for students to Experience the endlessly expanding boundaries available at SIU Carbondale. This Forum is a valuable showcase for the world to see students walking in the path ‘Know No Bounds’.”

—*Rodrigo Carramiñana, Director of the Center for Undergraduate Research and Creative Activities*

**Undergraduate Creative Activities and Research  
Forum  
April 4, 2016  
Southern Illinois University Carbondale  
Program**

Poster judging sessions: 8:30 a.m. - 12:30 p.m.

Public viewing session: 1:00 p.m. - 3:00 p.m.

Award presentations: 3:00 p.m.

- Creative and Scholarly Saluki Rookies' poster awards
- Forum poster awards by category
- SIU Carbondale Literary & Art Award awards
- REACH awards for 2016-2017 academic year
- CURCA Faculty Mentor Award of Excellence

**CURCA Organizers**

**Coordinator:** Anthony Farace, CURCA

**Judges:** Anne Waring, CURCA

**Event Manager:** Ouadie Akaaboune, CURCA

**Sponsors**

- Office of the Vice Chancellor for Research
- Office of the Provost
- The Sustainability Council
- Colleges: Agricultural Sciences, Applied Sciences and Arts
- Business, Education and Human Services, Engineering, Liberal Arts, Mass Communication & Media Arts, & Science
- Center for Undergraduate Research & Creative Activities (CURCA)

## **SIU Carbondale Literary & Art Award**

### **Coordinators**

Allison Joseph, Department of English

Pinckney Benedict, Department of English

Jon Charles Tribble, Department of English

The SIU Carbondale Literary & Art Award recognizes creative excellence in the categories of poetry, fiction, and visual art as published in *Grassroots*, SIU Carbondale's undergraduate arts magazine. Award winners are chosen, through an identity-blind process, based on the scope and ambition of the project undertaken, the energy and intensity of the project's execution, and the effectiveness of the project's final form in achieving its high artistic aims. From 239 submissions, the *Grassroots* editors chose for inclusion in the magazine 10 pieces of fiction and plays, 25 pieces of poetry, and 17 pieces of visual art. Of those, one will be named the SIU Carbondale Literary & Art Award winner in each category, with two runners-up in each category.

## **CURCA Faculty Mentor Award of Excellence**

The Center for Undergraduate Research and Creative Activities (CURCA) is awarding faculty from each college who have mentored undergraduate students in research and/or creative activities outside of the classroom. This award is created to recognize faculty mentors within each college who dedicate time and effort to help undergraduate students expand their knowledge through research and/or creative activities. Each faculty mentor is selected by their college. The awarded mentor will receive a commemorative plaque which is presented at the Undergraduate Creative Activities and Research Forum.

**Thank you to all faculty, staff, and graduate students who are sharing time and expertise to serve as judges at the 2016 Undergraduate Creative Activities and Research Forum. The following list is of individuals confirmed at the time of posting.**

**8:30-10:30**

**Name**

Alongi, Beth  
Al-Wreikat, Assyad  
Asirvatham, Jebaraj  
Baer, Sara  
Bany, Brent  
Barnett, Deborah  
Best, Kaleigh  
Byrne, Conor  
Chevalier, Lizette  
Chugh, Yoginder  
Dhokal, Krishna  
Donahoo, Saran  
Drake, Chad  
Fan, Li  
Fisher, Derek  
Gagnon, Keith  
Gilbert, David  
Henson, Harvey  
Howe, Savannah  
Jensik, Philip

**Name**

Lickteig, Duane  
Lopez, Robert  
Mazumdar, Dipanjan  
McDaniel, Justin  
Melton, Katie  
Mihai, Lefticariu  
Neubig, Kurt  
Pathiravasan, Chathurangi  
Poitevin, Rene  
Poitevin, Rene  
Porter, Jared  
Raymer, Angie  
Roberts, Lindsey  
Sanders, Heather  
Sanders McDonald, Shannon  
Seymour, Rhetta  
Silbert, LEO  
Sinche, Federico  
Stephens, Casheena  
Szczepanik, Nicole



**Name**

Kirschman, Lucas  
Kurtzhals, Geory  
Lang, Vicki  
Lee, Seung-Hee

**Name**

Trevizo, Lizzie  
Vaughn, Troy  
Warnakulasooriya, Nirnanjan  
Weston, William

**10:30-12:30****Name**

Adams, Tianjiao  
Al-Wreikat, Assyad  
Bender, Kelly  
Bhaumik , Sukesh  
Bheemireddy, Sambasiva  
Brooks, Marj  
Burns, Deborah  
Bylapudi, Gopi  
Catenazzi, Alessandro  
Chevalier, Lizette  
Collins, K.K  
Delsing, Maria  
Deria, Pravas  
Dunkel, Ron  
Ergan, Mehmet  
Farquharson, Garcia  
Feller, Jessica  
Frazier, Rachel  
Gallaba, Dinuka

**Name**

Lakshmanan, Usha  
Lang, Vicki  
Lautar, Charla  
Lickteig, Duane  
Lightfoot, David  
Mainali, Pramish  
Mazumdar, Dipanjan  
Miski, Masita  
Narayan, Prema  
Nichols, Jane  
Ocon, Karen  
Poitevin, Rene  
  
Poopalasingam, Sivakumar  
Potter-McIntyre, Sally  
Randolph, Nova  
Roberts, Lindsey  
Schauber, Eric  
Seymour, Rhetta

**Name**

Geisler-Lee, Jane  
Gilbert, David  
Goodson, Boyd  
Graham, Robert  
Grisley, Dawn  
Hackbart, Pamela  
Janssen, Travis  
Kashiwagi, Tom  
Khalil, Belan  
Kil, Namyu  
King, Mandy  
Kolay, Prabir

**Name**

Shajesh, Kuloth  
Silbert, LEO  
Slown, Kendra  
Smith, Linda McCabe  
Szczepanik, Nicole  
Thompson, Stacy  
Trevizo, Lizzie  
Vaughn, Troy  
Wallace, Juliane  
Weshinskey, Nick  
Williams, Matthew

**Students****Mentors**

<b>Number</b>	<b>Last Name</b>	<b>First Name</b>	<b>Last Name</b>	<b>First Name</b>
1	Abeln	Jen-Luc	Whitledge	Gregory
2	Anderson	Luke	Pond	Amber
3	Bach	Daniel	Kapur	Jyotsna
4	Bales	Liana	Goodson	Boyd
5	Ballek	Sara	Chalmers	Pattie
6	Banning	Katy	Catenazzi	Alessandro
7	Barron	John	Talapatra	Saikat
8	Bartels	Natalie	Lopez	Robert
9	Bengtson	Megan	Lefticariu	Mihai
	Brito	Gabriela		
10	Berger	Sam	Chitambar	Eric
11	Biver	Weston	Neubig	Kurt
12	Bleich	Andrew	Neubig	Kurt
13	Botello	Laura	Gupta	Ramesh
14	Brady	Rachel	Morehouse	Christopher
15	Broster	Kayla	Gage	Karla
16	Brothers	Sidney	Boyer	Valerie
17	Brown	Erin	Boyer	Valerie
18	Brown	Ebony	Hylin	Michael
19	Brown	Joel	Rose	Gregory
20	Brown	Megan	Brooks	Marjorie
21	Cairo	Ariadna	Gagnon	Keith
22	Cairo	Gisela	Gagnon	Keith
23	Carpenter	Shelby	Davie	Judy
24	Catt	Margaret	Chen	Da
	Novick	Ashton	Zheng	Patrick
25	Caylor	Jordan	Henson	Harvey
26	Chandler	Landon	Anton	Phil
27	Choi	Won Jun	Kohli	Punit
28	Chung	Krystal	Du	Zhihua
29	Cobb	Brittan	Davie	Judy

	Reiman	Felicity	Pond	Amber
30	Cocom	Jennyfer	Hylin	Michael
31	Colley	Nathan	Colley	Nathan
32	Cook	Clance	Yepsen	David
33	Cralley	Joseph	Sheng	Yanyan
34	Davidson	Andrea	Drake	Chad
35	Davidson	Andrea	Lee	Jaehoon
36	Dawkins	Cody	Dunkel	Ron
37	DeKoster	Tim	Whitledge	Gergory
38	Derby	Andrew	Lydy	Michael
39	DeRossett	Lauren	Fromherz	Sylvia
			Sharp	Andrew
40	Dethrow	Nicole	Cheatwood	Joe
			Pond	Amber
41	Discepolo	Dakota	Venable	Erin
42	Doan	Europe	Davie	Judy
43	Dolecki	Maxim	Anderson	Frank
44	Druessel	Logan	Bany	Brent
45	Earles	Baylen	Rose	Greg
46	Eaton	Miller	Jayasekera	Thushari
47	Edgerton	Leah	Anton	Phil
48	Emig	Dustin	Gage	Karla
			Miller	Eric
49	Falat	Hayley	Jimenez	F. Agustin
50	Fisk	Thea	Bloom	Stephen
51	Flatt	Taylor	Geisler	Matt
			Zhu	Michelle
52	Fleming	Alia	Kibby	Michelle
53	Flores	Martin	Sharp	Andrew
54	Forehand	Samantha	Fagerholm	Thomas
55	Frailey	Anna	Gibson	David
56	Francis	Andrea	Benyas	Edward
57	Frankovich	Paige	St. George	Mark
58	Frassato	Austyn	Sharp	Andrew
59	Geerling	Elizabeth	Narayan	Prema

60	Gibson	Miranda	Dollinger	Stephanie
61	Gibson	Miranda	Dollinger	Stephanie
62	Glaub	Erika	Anderson	Frank
63	Gloss	Sean	Porter	Jared
64	Gougis	Raven	Cheatwood	Joseph
65	Green	Demetrius	Lawrence	Novotny
66	Gulson	Natalie	Venable	Erin
67	Gutkowski	Marissa	Warne	Robin
68	Hall	Sophia (Mary)	Nsofor	Emmanuel
69	Hall	Jennifer	Hylin	Michael
70	Hameed	Sohaib	Pond	Amber
71	Hammond	Kari	Rodriguez	Benjamin
72	Hashmi	Mariam	Pond	Amber
73	Hauser et al.	Mitchell	Janello	Tim
74	Heller	Yahaira	Poitevin	Rene
75	Henning	Bradley	Porter	Jared
76	Hernandez	Javier	Buck	Hales
77	Higginbotham	Jessica	Hales	Buck
78	Hirschman	Stephanie	Conder	James
79	Hite	Natalee	Hylin	Michael
80	Hooppaw	Anna	Fisher	Derek
81	Hosto	Robert	Gage	Karla
82	Jelinek	Emily	Thompson	Jan
83	Jilek	Sarah	Joseph	Allison
84	Jing	Ren	Soares	Andrey
85	Johnson	Taylor	Jarvis	Cheryl
86	Johnson et al.	Becca	Gilbert	David
87	Jones	Trevor	Scott	Aaron
88	Jones	Jared	Olsen	Michael
89	Jordan	Kristina	Neubig	Kurt
			Garwood	Nancy
90	Jung	Hong	Chung	Sam
91	Justice	Dakota	Whaley	Gray

92	Kahil; Lucas	Sondus; Briana	Choudhary	Ruplal
93	Kauffman	Kelsey	Anz	Craig
94	Kelley	Jayne	Venable	Erin
95	Kim	Youn Jae	Chung	Sam
96	Kleiman	Kevin	Habib	Reza
97	Koester	Zoey	Schwartz	Chad
98	Kohli	Ayush	Rahimi	Shahram
99	Kovac	Sarah	Mazumdar	Dipanjan
100	Lacey	Jonathan	Ebbs	Stephen
101	LePla	Aimee	Lee	Seung-Hee
102	Leverett	Noah	Park	Meungguk
103	Lindt	John	Lightfoot	David
104	Lockett	Robert	O'Rourke	Ruth
105	Logterman	Lisa	Drake	Chad
106	Luebke	Sarah	Franca	Maria
107	Matschke	Lea	Fisher	Derek
108	McClellan	Kesia	DiLalla	Lisabeth
109	Mcneer	Matt	Medvecz	Erin
110	McQueen	Shannon	Catenazzi	Alessandro
111	Meador	Wilson	Morris	Donald
112	Mersman	David	Kowalchuk	Rhonda
113	Miller	Jeremiah	Konjufca	Vjollca
114	Morris	Gabrielle	Boyer	Valerie
115	Murray	Leslie	Auxier	Randall
116	Novak	Amanda	Castillo	Cristina
	Antrim	Summer		
117	Nunn	Austin	Kurtzhals	Geory
118	O Donnell	Olivia	Franca	Maria
119	Oltman	Samuel	Pericak	Kathleen
120	Orr	Shelby	McDonald	Shannon
121	Oseland	Eric	Gage	Karla
122	Ovington	Katy	Porter	Jared
123	Park	Yeonhoon	Chung	Sam
124	Peterson	Emily	Liang	Yanna

125	Peterson	Richard	Mazumdar	Dipanjan
126	Pokojski	Tyler	Fakhoury	Ahmad
127	Purdom	Avery	Kim	Jun
128	Race	Kimberly	Lee	Seung-Hee
129	Raymond	Amelia	Taylor	Bradley
130	Reed	Kelsey	Gisler-Lee	Jane
131	Rensing	Sydne	Alongi	Beth
132	Richardson	Ethan	Jones	Eric
133	Richardson	Tia	Drake	Chad
134	Roberts	Mallory	Arbogast	Lydia
135	Rogers	Kelby	Chu	Tsuchin
136	Roller	Shawn	Hylin	Michael
137	Rothschild- Frey	Jocelyn	Wallace	Juliane
138	Ruhde	Devon	Kertz	Sarah
139	Sall	Michael	Fakhoury	Ahmad
140	Sanchez	Francesca	Konjufca	Vjollca
141	Schorsch	Peter	Soares	Andrey
142	Secrist	Eric	McDonald	Shannon
	Maloney	Matt		
	Bell	David		
143	Sellek	Hailey	Arbogast	Lydia
144	Semel	Sierra	Eichholz	Michael
145	Sever	Haleigh	Lydy	Michael
146	Sherman	Austin	Gage	Karla
147	Snowden	Magan	Sims	Cynthia
148	Sonnenberg	Joshua	Kocik	Jerzy
149	Starkweather	Kara	Hales	Dale
150	Stieve	Taylor	Lee	Seung-Hee
151	Stodden	Briana	Aquayo	Angela
152	Stonehouse	Gavin	Neubig	Kurt
153	Swenney	Tasha	Hylin	Michael
154	Szubryt	Austin	Geisler- Lee	Jane
155	Taylor	Jordan		

156	Teran	Carlos	Mondal	Kanchan
157	Thomas	Jorden	Drake	Chad
158	Thomas	Andrew	Goetz	Steven
159	Thompson	Isaiah	Drake	Chad
160	Tolbert	Naomi	Bricker	Benjamin
161	Trevino-Pena	Luis	Youpa	Andrew
162	Tuksakulvith	Noppadol	Martin	Karen
163	Vandermark	Cailey	Boyles	Esmarie
164	Vargas	Grace	Caceres	Alejandro
	Storey	Andrea		
165	Vignovich	William	Neubig	Kurt
166	Voegel	Taylor	Thompson	Stacy
167	Walker	Andrew		
168	Walters	Emily	Bruns	Deborah
169	Wang	Kevin	Olsen	Michael
170	Weigle	Austin	Anterola	Aldwin
171	Wilkinson	Dylann	Kertz	Sarah
172	Yarnell	William	Wallace	Juliane
173	Zneimer	Stephania	Lefticaiu	Liliana



**Creative and Scholarly**  
**Saluki Rookies**

201	Agwuncha	Kelechi	Martinez	Antonio
202	Bertrand	Alexander	Dougherty	Betsy
203	Bielawa	Alex	DeVantier	Bruce
204	Fuller	Nicole	Gagnon	Keith
205	Hall	Megan	Soares	Andrey
206	Hennig	Samantha	Lautar	Charla
207	Hutson	Kaitlyn	Moran	Sean
208	Mcminn	Madison	Elliott	Lee
209	Meyers	Alyssa	Kibby	Michelle
210	Troll	Michael	Strader	April

# 2016 ABSTRACTS



**Jen-Luc Abeln, Anthony P. Porreca, William D. Hintz, James E. Garvey, and Gregory W. Whitley**

Center for Fisheries, Aquaculture, and Aquatic Sciences, Southern Illinois University Carbondale

*Velocity preference and behavioral response of Scaphirhynchus sturgeons within a heterogeneous flow field*

Lotic ecosystems present fluvial specialist species with highly variable velocity landscapes. The federally endangered pallid sturgeon *Scaphirhynchus albus* and threatened shovelnose sturgeon *S. platyrhynchus* are two fluvial specialists that may occupy heterogeneous flow fields within large rivers. We designed an experiment to quantify velocity preference and the behaviors associated with occupying different environmental velocities for these sturgeons at two life stages. Forty juvenile (age-1; 20 from each species) and 20 subadult (age-5; 10 from each species) sturgeon were individually subjected to a heterogeneous flow field in a large experimental tank. After a 30 minute acclimation period, velocity occupied by the fish was measured once every two minutes for 20 minutes with a hand held velocimeter. Swimming behavior (moving upstream, moving downstream, and station holding) was recorded along with each measurement of velocity. Downstream movement was the most common behavior for age-1 shovelnose sturgeon, while station holding was more common in age-1 pallid sturgeon. At age-5 sturgeon, downstream movement was more common for shovelnose sturgeon compared to pallid sturgeon, but station holding was equally displayed by both species. Upstream movement was the least common behavior displayed by either species. However, upstream movement was more common in larger fish. Multinomial logistic regression (MLR) was used to predict the probability of a fish exhibiting each swimming behavior based on water velocity. Predicted values from the MLR revealed that the probability of downstream movement increased with mean occupied velocity, while station holding decreased as velocity increased. These results suggest that fluvial specialists like *Scaphirhynchus* sturgeon exhibit behavioral adaptations to flowing water environments.

**Luke Anderson and Amber Pond**

Anatomy Dept., School of Medicine.

*Denervation increases expression of E3 ligases in skeletal muscle.*

Skeletal muscle atrophy is the loss of muscle size and strength caused by an imbalance in protein degradation and protein synthesis. It often occurs with neural and skeletal muscle injuries and disease which lead to muscle disuse. If unabated, skeletal muscle atrophy can be very debilitating and even cause death. Denervation of skeletal muscle leads to increased protein degradation and atrophy. Proteolysis, including the activity of the ubiquitin proteasome pathway (UPP), is known to be increased with loss of innervation. UPP enzymes called E3 ligases present targeted proteins to the proteasome for degradation. We hypothesized that expression of genes encoding the E3 ligases *MAFbx/ATROGIN1* and *Murfl* would increase early after denervation. Here, we explore the time course of expression of these E3 ligases in response to sciatic nerve transection. Briefly, the left legs of 50 mice were denervated by transecting the sciatic nerve while the right legs underwent sham surgery. The gastrocnemius muscles were harvested on days 0-7, 10, and 14 post denervation. RNA was isolated with Trizol, reverse transcribed, and gene expression was measured using qPCR. The data reveal that there is a steady increase in the amount of *MAFbx/ATROGIN* mRNA in the denervated leg over the control within the first four days, after which the expression levels off at approximately a 5 to 6 fold increase through day 14. Expression of *Murfl* increases steeply in days 1 and 2 and then somewhat stabilizes, vacillating between a 4 to 8 fold increase through day 14. The hypothesis is accepted: expression of both E3 ligases begins to increase early after denervation.

**Daniel Bach and Jyotsna Kapur, Ph.D.**

Department of Cinema and Photography

*The Rainmaker's Garden*

You enter a room, choose a seat, the lights go out, the screen comes on, and cinema takes the viewer to another place entirely. Yet, one of the important insights of cinema studies has been that life itself has become increasingly cinematic over the course of the 20th century and into our own. Much of our experience of life itself is cinematic, in that it is both actual and virtual and our responses are both conscious and unconscious. I am interested in exploring this in relation to art works that would otherwise be considered non-cinematic. There are many places across the US that I have seen, but few share the unique exceptional story of what's been growing in Makanda, IL. There at the foothill of Giant City State Park grows a garden. Much more than an innocuous blip on the radar, the garden growing is known as The Rainmaker's Garden. Just behind the boardwalk David Dardis, an artist and metalsmith, has spent the last 40 years cultivating and curating plants, art, rock, and other things that were once deemed to be of no value. I propose to create an experimental documentary film. Through the lens of a camera I will seek to find the connection between how our experience of place, like the garden, evokes intimate experiences, bringing back dreams, memories, and childhood experiences. Dave experienced his formative years during the Vietnam protests at Southern Illinois University in Carbondale, his generation was divided by war, civil rights, and a rebellion against the old adage of "get a haircut and get a job". What I expect to find in that garden is the story of a hard fought battle for freedom from expectation. The outcome will be an advancement for film theory and our understanding of the connection.

**Liana Bales, Max Gemeinhardt, Banan Alsuhaibani, Brian Heine, Alissa Totheroh, and Boyd Goodson, Ph.D.**

Department of Chemistry and Biochemistry

*NMR Spectroscopy Enhancement Using Signal Amplification by Reversible Exchange*

Scientists are researching how to generate a new system to decrease cost and length of magnetic resonance imaging (MRI) scans. Signal amplification by reversible exchange (SABRE) may be able to achieve this goal. It is a reaction process that transfers the nuclear spin hyperpolarization from parahydrogen to various catalysts. This process first starts with altering the ratio of the two spin states of hydrogen, parahydrogen and orthohydrogen. When hydrogen flows through an aluminum coil containing a catalyst, iron (II) oxide, a percentage of orthohydrogen is converted into parahydrogen. This conversion is detected using nuclear magnetic resonance (NMR). Parahydrogen has opposite spins, so it is not detectable with NMR while orthohydrogen has spins in the same direction and is detectable. Therefore, when orthohydrogen is converted to parahydrogen, the signal from NMR decreases. Hydrogen containing an even higher percent of parahydrogen can also be obtained by submerging the coil in liquid nitrogen since parahydrogen is more stable at low temperatures. These signals can be enhanced sufficiently enough so the NMR peaks become inverted. In this experiment, the hyperpolarization of the newly converted parahydrogen was used to transfer spin order to the catalyst [IrCl(COD)(IMes)] by bubbling parahydrogen into an NMR tube containing the catalyst for 30 seconds, 1 minute, 90 seconds, and 2 minutes. The enhancements, respectively, for one set of NMR spectra were -7.1287, -7.8146, -9.0888, and -12.2666, yielding an average enhancement of -9.0747. Currently, other various catalysts are being used in an attempt to further enhance the NMR signal.

**Sara Ballek, Pattie Chalmers**

School of Art and Design, Ceramics

*Access to Art: The Vergette Gallery*

It is important for those who chose to pursue a career in the arts to consider the opportunities of what they are capable of aside from just being a maker or designer. The purpose of this study is to learn the roles and responsibilities of a gallery manager.

Serving as the Vergette Gallery Director is an essential step in the development of a student's professional capabilities. In this position, the student selects artists for the exhibition schedule featured annually by the gallery, oversees the gallery and recruits new artists for the space. The mission of this position is to educate and provide access to art. The gallery director provides an exhibition space for artists to show their work in a professional setting. Focusing on current students at the undergraduate and graduate, the goal is to present contemporary art to the Southern Illinois region.

This gallery director position provides experiences that allow for greater versatility in students' future endeavors. The position provides skills that will give the students a competitive edge when looking for employment or to furthering their education. As the economy becomes more global, the competition for jobs within students' specializations continues to increase. A student in the arts can greatly enhance their success in the job and art market by expanding their abilities beyond the specifics of their field. The skills developed as an undergraduate gallery director would add breadth to their knowledge of the art world, this is not only beneficial for students desirous of a profession in a museum or gallery, but also for those working as an artist, designer or art historian. An understanding even at this small scale of the workings of a gallery would enhance their classroom learning by gaining real world training in this position as Gallery Director.

**Katy Banning, Dr. Alessandro Catenazzi, & Dr. Robin Warne**

Department of Zoology

*Thermal Plasticity and Stress Response to Simulated Changing Climates in Andean Frogs*

Climate change is predicted to induce thermal stress in many organisms, however, it remains unclear how animals will cope with, and adapt to climate change. The capacity for animals to endure and adapt to changing thermal conditions may be related to the physiological plasticity of individuals to tolerate stressful situations. A suite of physiological traits underlie the capacity of animals to endure thermal stress, but central to these responses is the endocrine stress response regulated through the release of CORT (corticosterone). CORT hormone secreted by the adrenal glands, enables amphibians to physiologically and behaviorally cope with potential stressors. In our experiment, we tested the plasticity of thermal tolerance in relation to the CORT stress response in *Pristimantis pharangobates*, a frog species common to the mid-elevations of the Peruvian Andes. The Peruvian Andes are characterized by extremely steep elevational gradients, which may constrain the ability of animals to migrate in response to climate change and force them to rely upon physiological plasticity. Frogs were captured and transplanted from a mid-elevation to a lower elevation with overall higher temperatures and compared to frogs that resided at lower elevations. We first tested the CT<sub>max</sub> (critical temperature max) of the frogs; individuals were placed in water baths that were then exposed to increasing temperatures until the frog was unable to right itself. The water samples were then collected to extract and isolate CORT that the frogs had excreted. This was accomplished via freeze-drying the samples. We next evaluated the CORT levels of the individuals through EIA (Enzyme ImmunoAssay) analysis. Our results demonstrated that individuals translocated from higher elevations to a lower elevation, hotter climate displayed an overall higher CT<sub>max</sub> and this was mediated by a comparatively higher CORT stress response. This suggests that frogs have high plasticity in thermal tolerance, higher than commonly thought, and that acclimation responses to thermal stress are mediated in part by the CORT response.



**John Barron**

Department of Physics

*Synthesis and Electrochemical Characterization of Graphene Based Conductive Inks*

This project aimed to test plausible techniques for direct inkjet printing of graphene onto a substrate in order to further research into flexible electronics and energy related applications. Our lab has previously synthesized various layered materials using a liquid-phase exfoliation (LPE) process to and a vacuum filtration process for deposition onto a testable membrane. This project attempted to synthesize a conductive ink in order to deposit graphene directly onto a substrate. 2D printing of electrically active materials is a more recent area of study and allows for directly depositing the electrical materials, in the form of ink, onto a substrate using a printer, which would allow for easy and efficient deposition. Following the synthesis of the ink, tests were performed on the substrate in order to better understand the sample. Three devices were fabricated using the ink. I-V tests were run on these devices in order to ascertain information on the electrical properties. Initial data taken showed that the resistance of the ink goes up with temperature. A difference in resistance from device to device was also present, suggesting the possibility of aggregation of graphene flakes within the storage vial during the time between tests. FTIR was performed on the sample in order to check for chemical bonding of the solute with the graphene flakes. Finally, gas sensing tests were performed on one of the devices, showing that the electronic properties of the graphene are affected by the presence of a gas, but that there was no significant presence of adsorbed gas following the removal of the device from the vapors. It should be noted here that at the time of writing this abstract, some tests were still being performed in order to improve on our data. The full data and results will be present in the accompanying poster.

**Natalie Bartels and Robert A. Lopez**

School of Art and Design, Communication Design

*Communicating Through Design*

As the Undergraduate Assistant for the School of Art and Design, my design research has included brainstorming, researching current design trends and concepts, and collaborating with faculty to create various forms of design work to promote the School of Art and Design. My focus is to successfully recruit new students and increase student involvement through design, while following SIU's brand guidelines. A majority of research is dedicated to incoming students and how to better prepare them for the School of Art and Design as well as help guide them into the right specialization. I have created information sheets of each of the school's eleven specializations to inform incoming or current students on what each of our programs has to offer. The goal of these sheets is to clearly communicate the specialization through well organized design. These sheets contain information about the specialization, upcoming events, recent graduates, faculty, and a full four-year course plan for students in that specific specialization. While creating these sheets, I collaborated with all of the faculty from the School of Art and Design to receive updated and correct information and pictures while staying within SIU's branding guidelines. These sheets effectively communicate all the information needed for a prospective SoAD student. Along with specialization sheets, I have also created multiple posters for on-campus events and recruitment in addition to apps and videos. These projects not only convey information, but through successful design they create attention for the School of Art and Design. This in turn creates greater audiences at events, more student involvement in our RSO's, more interest from potential students and a better understanding of what the School of Art and Design has to offer.

**Megan Bengtson<sup>1</sup>, Gabriela Brito<sup>2</sup>, Mihai Lefticariu<sup>3</sup>, Megan Czerniejewski<sup>4</sup>, Ryan Wiltshire<sup>5</sup>, Amelia Raymond<sup>5</sup>, and Bradley Taylor<sup>5</sup>**

<sup>1</sup>Department of Zoology, <sup>2</sup>Department of Microbiology, <sup>3</sup>Mass Spectrometry Facility, <sup>4</sup>Department of Chemistry and Biochemistry, <sup>5</sup>Department of Plant, Soil, and Agriculture Systems

*Antioxidants in Jonathan apples of Southern Illinois: Extraction and identification*

Free radicals are unstable molecules that are naturally formed when the body converts food into energy and can damage healthy cells. Antioxidants are important for our health because they can neutralize the free radicals present in our body. Phenolic compounds were extracted as a group from peels of Jonathan apples collected from the Southern Illinois University Horticultural Research Center orchard in September and October 2015. Prior to extraction, the peel samples were freeze-dried because the process preserves the phenolic content of the samples better than oven or air-drying. After freeze-drying the samples were grinded and homogenized. A 100 ml of 80/20 methanol-water solvent mixture was used in the extraction of phenolic antioxidants from about 1g of dry sample. The extraction process was optimized by sonication, centrifugation (isolation of the extract from the remaining peels), and finally filtration under vacuum to ensure that no fine suspended particles were left. The phenolic antioxidants were isolated from the filtered extract by solid-phase-extraction and were pre-concentrated by evaporation. Extracts were screened for nine phenolic compounds by reverse-phase HPLC with UV-Vis detection. P-coumaric acid, lauryl gallate, propyl gallate, quercetin, and phloridzin have been identified by HPLC in the apple peel extracts.

**Samuel Berger and Dr. Eric Chitambar**

Department of Physics

*Bell Inequalities Enhanced with PR Boxes*

The CHSH-Bell Inequality is used to test if a theory is local based. Quantum Mechanics violates the CHSH-Bell Inequality and thus Quantum Mechanics is not a local theory. Mermin thought of a device that would demonstrate how weird the world is around us, in particular how weird Quantum Mechanics can be. This device uses a form of the CHSH Inequality to describe how it operates. This system is found to behave according to Quantum Mechanics. However, this behavior is not explainable with the provided information about how the device works and for the limitations put on the system. What we aim to do is enhance Mermin's system with PR Boxes so that this new system will behave similar to Quantum Mechanics. Our hypothesis is that by enhancing this system with PR Box(es) we will be able to have a system that can replicate the observations of quantum mechanics while also explaining how the system behaves. We use one PR Box and see how close this result is to the Quantum System and then we use a second PR Box to see if we can improve this result and get even closer to or beat Quantum Mechanics.

**Weston Biver<sup>1</sup>, J. Richard Abbott<sup>2</sup>, Robert Naczi<sup>2</sup>, & Kurt Neubig<sup>1</sup>**

<sup>1</sup>Department of Plant Biology, Southern Illinois University of Carbondale, Carbondale, Illinois 62901

<sup>2</sup>New York Botanical Garden, 2900 Southern Blvd., Bronx, New York 10458

*Phylogenetic relationship of Hudsonia (Cistaceae): a North American endemic genus*

Abstract: Cistaceae are a small family of plants, most of which are shrubs dispersed across Mediterranean climates of Europe and North America. Previously published phylogenetic work based on the analysis of plastid *rbcL* and *trnL-trnF* sequences has shown *Hudsonia* embedded in another genus – *Crocanthemum*, but with poor statistical support and little taxon sampling and thus low confidence. We sampled additional species of *Hudsonia* with several samples per species to test its phylogenetic placement within Cistaceae. Our data indicate that *Hudsonia* is sister to *Crocanthemum*. Given those results, its morphological distinctiveness and the desire to create stable classifications, we believe that the genus *Hudsonia* should be recognized. These results underscore the importance of the objective measure of developing evolutionary hypotheses in order to determine taxonomy.

**Andrew Bleich, Kyle Wright, & Kurt Neubig**

Department of Plant Biology

*Are there cryptic species in the North American Seneca snakeroot, *Polygala senega* (Polygalaceae)?*

Abstract: *Polygala senega* is a small herbaceous plant belonging to the *Polygalaceae* family. It is native to the United States and southern Canada. *Polygala senega* grows to approximately 50 centimeters in height with its stems ending in inflorescences of small white flowers. The roots of this plant are commercially valuable for medical compounds. Due to systematic questions regarding the taxonomy of this plant, we broadly sampled more than 30 individuals of this species across its geographic range. *Polygala senega* DNA was sequenced for the nrITS and trnL-F loci. We found that there are two sister clades of *Polygala senega* that may represent two distinct species. This research is important because it directly documents the biodiversity of plant species, which would be underestimated without this objective measure of study.

**Laura Botello**

Department of Chemistry and Biochemistry

*Determining the role of Gar1 protein in the H/ACA ribonucleoprotein complex of Haloferax volcanii*

Pseudouridine is the most common posttranscriptional modification found in RNAs. This is brought about either by stand-alone protein enzymes called pseudouridine synthases or by ribonucleoprotein complexes. The ribonucleoprotein complexes consist of cbf5, the catalytic protein and three accessory proteins Gar1, Nop10 and L7Ae. Studies on crystal structure of this complex predict that Gar1 might be involved in the release of the product after modification thus playing a role in turnover. 23S rRNA in *Haloferax volcanii* has three pseudouridine modification at positions 1940, 1942, and 2605. We could not delete Gar1 gene from *Haloferax volcanii* genome. However, it could be deleted in a strain where Cbf5 gene has been deleted. We predicted that absence of Gar1 inhibits product release after modification resulting in non-viable cells. We found that the double deleted strain for Cbf5 and Gar1 cannot be transformed with plasmid borne copy of cbf5. However, the catalytic mutant of cbf5 can be transformed in this strain suggesting that if an active complex is formed, Gar1 is essential for product release. Now we would be checking whether this catalytic mutant protein is produced within the cells. We predict that double- deleted strain can be transformed with two plasmids, one containing Gar1 and the other containing Cbf5.

**Rachel Brady**

School of Music

*Music Festivals: Community Outreach Furthering Music Education*

Study after study has found that music education has a positive impact on a child's social and cognitive development. Despite this, schools are cutting funding to music programs nation-wide. The School of Music at Southern Illinois University Carbondale (SIUC) has multiple events on campus that promote music education. Working with area band directors and the Illinois Music Education Association (ILMEA), SIUC host multiple festivals from clinics to competitions to honor programs. Through these festivals, students are pushed above and beyond the standard band or chorus classroom and rekindle a love of music and a love of learning that can be brought back to their individual schools. This project shows how these festivals are put together, ran, and their impact on the community around us.



**Kayla Broster, Kaylee Agney, and Karla Gage**

Department of Plant Soil and Agricultural Systems

*The allelopathic effects of Palmer amaranth (*Amaranthus palmeri*) on the growth of plants.*

Illinois is an important producer of corn and soybeans, with corn accounting for more than 54 percent of Illinois' income from agricultural industries. Weeds, such as Palmer amaranth (*Amaranthus palmeri*), left uncontrolled in corn and soybean fields can result in yield loss in crops like corn and soybeans. Palmer amaranth is becoming more common in the Midwest, and is evolving resistance to multiple herbicide modes of action. Palmer amaranth is fast growing and gains biomass quickly, competing with corn and soybeans for growing space, light, and nutrients; making it necessary for growers to gain control over the situation to prevent yield reduction. In addition to competing with crops, Palmer amaranth is known for having allelopathic interactions, potentially resulting in yield loss. Allelopathic effects, which are biochemical interaction between plants, have been observed between Palmer amaranth and several plant species, however, effects on corn and soybeans are unknown. A greenhouse study was conducted to test this, using two different finely-ground residues, corn and Palmer amaranth. Corn residue was chosen as the control, since it is known to have no allelopathic effects in the agricultural field. Corn, soybean, tomato, and Palmer amaranth seeds were planted in soil in separate 10-cm pots in the greenhouse, and equal amounts of either corn or Palmer amaranth residues were added to the surface of the pots. Tomato germination has been shown to be sensitive to Palmer amaranth allelopathic compounds, so the tomato plants were used as comparisons. Multiple seeds of each plant were planted per pot, and time until germination was recorded for each pot. The first plant to germinate was noted and all other germinating seedlings were removed to prevent competition within the pots. Growth rates for the first plants to emerge were [WILL BE] recorded over a period of 6 weeks. [DATA ARE STILL BEING COLLECTED.]

**Sidney Brothers-Waring, Faculty Mentor: Dr. Valerie Boyer**

Rehabilitation Institute

*Application of Invented Rule with School-Aged Children*

Speech-Language Pathologists (SLPs) are often faced with the challenge of identifying language disorders in school-aged children in a time-sensitive and efficient manner. Recently, a new form of dynamic assessment has emerged in literature known as the invented rule procedure which can be used as a screening tool to help aid SLPs in this process. The invented rule procedure teaches a child a novel but nonsense language rule and asks the child to apply this novel rule following a training protocol. In previous literature, the invented rule has been the application of a novel, morpheme applied as a suffix to vocabulary items to indicate “part of” an object. This study looked at whether or not the placement of a bound morpheme affects a child’s performance on a novel, invented rule task. Specifically, the difference between utilizing the invented rule as a prefix verse as a suffix was considered.

In addition, task performance was also compared with individual participant’s scores on the Peabody Picture Vocabulary Test-III (PPVT-4), and Comprehensive Test of Phonological Processes-2 (CTOPP-2). This was performed to investigate whether or not a child’s performance on semantic and phonological measures correlates with performance on an invented rule task. The correlations found between these measures and the invented rule task performance may be able to indicate if the assessments are assessing different areas of language.

Knowledge regarding the application of the invented rule task as a prefix and a suffix, and the comparison of task performance results to other assessments, can potentially help determine whether flaws in language use or production are a consequence of a language difference or a language disorder. It is anticipated that the results of this study will play a critical role in language assessment.

**Erin Brown and Valerie Boyer**

Communication Disorders and Sciences Program

*Autism Spectrum Disorder and the Criminal Justice System:  
An Inter-Collaborative Study*

The purpose of this study was to advocate and raise awareness of individuals with autism spectrum disorder (ASD) to SIU law students and to inform communication disorders and science (CDS) students of some basic facts about the criminal justice system in the United States.

To accomplish this, an interdisciplinary session was conducted in which three CDS students taught ten law students about characteristics of ASD and three law teacher assistants taught thirteen CDS students about disability law and other intricacies of the justice system. Fifteen question pre-surveys were distributed to the participants upon arrival. CDS students answered questions about court proceedings and defendant rights and law students answered questions about various ASD characteristics. Each group of students were divided into three groups (six groups total) and were taught information pertaining to the questions in the surveys in a collaborative manner. Afterwards, all participants took a post-survey identical to the pre-survey.

Post-survey results of the law students increased in accuracy by 19.35% (average 4.7 question increase). Post-survey results of the CDS students increased in accuracy by 15.9% (average 2.38 question increase). The interdisciplinary session succeeded in raising law students' awareness of autism spectrum disorder and increasing CDS students' knowledge of the criminal justice system.

**Ebony Brown and Dr. Michael Hylin**

Department of Psychology

*Early Injury in PND-17 rats*

The prefrontal cortex is one of the last brain regions to develop, which makes it more vulnerable to injury early in life compared to other brain regions. The prefrontal cortex has been shown to control motor skills, perception, sensation, cognitive thinking. There have been studies conducted that claim that it is more favorable to recovery to receive a traumatic brain injury (TBI) in early stages in development than after development has finished. To test this theory a group of post-natal day 17 (PND-17) rats were given closed cortical injuries (CCI) and were observed and evaluated on their deficits and recoveries in motor skills, spatial memory, and cognitive discrimination. The subjects were evaluated based on their performance in: beam walk, foot faults (motor skills), morris water maze (spatial memory), and the dig task (cognitive discrimination). The subjects were separated based on their sex and whether or not they were shams or CCI animals. It was found that there were significant differences in the performance between female shams and female CCI animals in the initial location component of the spatial memory task; there was also a significant difference in the performance of male shams and male CCI animals in the reversal component of the spatial memory task. The study also found there is a significant difference in performance in shams of both sexes between CCI animals of both sexes. It is the hope that this research can aid in determining deficits so therapies can be developed.

**Joel Brown and Gregory Rose, Ph. D.**

Department of Anatomy

*Examination of Internalizing Behaviors in Adolescents with and without ADHD*

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders in the United States. Other psychological difficulties, such as anxiety, depression, and certain types of learning disabilities, are also found in adolescents with ADHD. Despite recent advances in the fields of psychology and medicine, much remains to be learned about potential relationships between ADHD, anxiety and depression. Based on current literature, I hypothesized that adolescents with ADHD will perform worse in anxiety, depression, and attention scales than same-aged controls. Participants with ADHD were recruited from Brehm Preparatory School in Carbondale, IL; typically developing participants were recruited through flyers and word of mouth from southern Illinois. The study examined a total of 26 adolescents (12 with ADHD) between the ages of 13 through 19. Each participant was given a Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II) to test for general intelligence and the BASC-2 (Parent Rating Scale) to assess anxiety, depression, hyperactivity and attention problems. Our results indicated that control participants scored better on the IQ test than those with ADHD [ $t(24) = -3.55, p = .002$ ]. Adolescents with ADHD scored worse than control students on hyperactivity [ $t(25) = 6.007, p < .001$ ], and attention problems [ $t(25) = 5.263, p < .001$ ]. Furthermore adolescents with ADHD scored worse on anxiety [ $t(25) = 2.076, p = .048$ ] and depression tests [ $t(25) = 2.080, p = .048$ ]. Thus, the results from this study appear to support previous suggestions that adolescents with ADHD seem to have more problems with anxiety and depression compared to control subjects. An analysis of resting state functional brain images to examine neurobiological differences between these two groups is currently underway.

**Kaitlyn Holtsclaw, Megan Brown\*, and Marjorie L. Brooks**

Department of Zoology

*Ecological Role of Beavers in Waterways*

The purpose of this field experiment was to determine the impact of beavers when they establish in waterways where they were not previously present. This research is important due to the resurgence of beaver populations in recent years. In the 1600s, beaver likely ranged from Canada to Mexico but were pushed to the brink of extinction by the fur trading industry. Conservation efforts that started in the late 1900s have allowed beavers to start to make their way back across America. Many habitats in which beavers are reestablishing themselves have not seen beavers for decades. With this in mind, we wanted to test what effects beavers have on nutrients in aquatic environments. As part of a large research group studying artificial dams versus recently-established beaver dams in Yellowstone National Park, we compared phosphate and nitrate ( $\text{NO}_3^{2-}$ ,  $\text{PO}_4^{3-}$ ) concentrations in two streams in southern Illinois to streams in Yellowstone. We hypothesized: 1) waters above dams would differ significantly from warmer waters below dams and 2) streams in Yellowstone that are inhabited by beavers would contain higher levels of phosphate and nitrate than those that lack beavers but have similar hydrology (i.e. artificial pond complexes). We observed that  $\text{NO}_3$  and  $\text{PO}_4$  nutrients were significantly higher downstream than upstream of all dams in Yellowstone. The presence of beavers can significantly increase nutrient concentrations but may depend on the duration of their habitation. Overall, Illinois streams contained nutrient levels as high as beaver-inhabited streams in Yellowstone, however, further testing is required to exclude the influence of commercial fertilizers on Illinois streams. Yellowstone findings suggest liberation and transport of terrestrial nutrients into aquatic systems through beaver activity. In both systems, higher nutrient levels have important implications for ecosystem productivity and habitat quality in riparian zones.

\*The first two authors contributed equally.

**Ariadna Cairo and Keith Gagnon**

Department of Biochemistry and Molecular Biology

*The Role of Repeat RNA Aggregation in Lou Gehrig's Disease*

Amyotrophic lateral sclerosis (ALS), or Lou Gehrig's disease, is the most common lower motor neuron disease. It is characterized by rapid and progressive loss of motor control, with patients usually dying with 2 to 5 years of disease onset. Recently it was discovered that the leading cause of inherited ALS is the expansion of a naturally occurring repeat sequence in the C9orf72 gene. Unfortunately, this disease is currently incurable.

The repeat sequence in C9orf72 is expressed as a noncoding repeat expansion RNA (expRNA) gene product, which is prone to aggregation and accumulates as foci in the nucleus of patient neurons.

**Gisela Cairo and Keith Gagnon**

Department of Biochemistry and Molecular Biology

*CHARACTERIZATION OF RNA REPEATS THAT CAUSE NEUROLOGICAL DISEASE USING IR AND PAGE*

An expanded GGGGCC repeat in a non-coding region of the C9orf72 gene is a common cause of frontotemporal lobar degeneration (FTD) and amyotrophic lateral sclerosis (ALS). Non-coding repeat expansions may cause disease.<sup>1</sup> The goal of this paper is to analyze these RNA repeats using infrared spectroscopy (IR) and sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE or PAGE). We are looking to find a signature that is specific for the secondary structure the RNA repeats form and support the results with the PAGE gels.

The IR absorbed specific wavelength that suggested that the repeats were forming high order structures (e.g. G-quadruplex). We hypothesize that the wavelength shifts observed in the IR spectra may suggest changes in the secondary structure. In the IR spectra, the same shift happens for short and long repeats, which may suggest that short repeats behave similarly to the longer repeats regarding its structure. Regarding the likelihood of G-quadruplexes formation, sodium salt is an intermediate between potassium and lithium salts: while G-quadruplexes are highly favorable in potassium salt, G-quadruplexes are highly unfavorable in lithium salt. Potassium is thought to be the salt where G-quadruplexes are the most favorable to form in, which was supported by the sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) results. The gels show that the process in which the repeats form high order structures is potassium dependent.



**Shelby Carpenter and Dr. Judy Davie**

Department of Molecular Biology and Biochemistry

*SMARCA1 and Rhabdomyosarcoma*

In cancer development, epigenetic changes collaborate with gene mutations. Chromatin remodelers allow DNA to exist in the appropriate environment for processes like DNA replication or gene transcription to take place, suggesting that they play a critical role in cell division and differentiation. Rhabdomyosarcomas (RMS) are the most frequent soft tissue sarcomas in children. The role of epigenetic changes in RMS is poorly understood. The lab has recently shown that the mammalian homologues of the ISWI family of chromatin remodelers, SMARCA1 and SMARCA5, are highly expressed in RMS but not normal muscle.

SMARCA1 (SNF2L) has been shown to be highly expressed in other cancers, along with a truncated isoform of the SMARCA1 gene, called SNF2LT. SNF2LT contains an intron that acts as a stop codon and makes it shorter than SMARCA1. The ratio of SMARCA1 to its isoform was shown to regulate cell growth and apoptosis. The expression of SNF2LT in RMS was unknown. To initiate my study, I characterized an expression construct for SMARCA1 by running a restriction enzyme digest and sequencing the plasmid. To determine if RMS cell lines expressed the SNF2LT isoform, we ran PCR to identify SMARCA1 and SNF2LT on RMS lines representing both subtypes, ERMS (RD1 and RD2) and ARMS (RD30 and RD28). I found that while SMARCA1 is highly expressed, the SNF2LT isoform is not expressed in RMS. Next, I plan to determine if SMARCA1 acts as an oncogene in RMS. SMARCA1 will be depleted from RMS cells and cells will be assayed for proliferation, apoptosis and skeletal muscle differentiation.

**Margaret Catt, Ashton Novick, Dr. Da Chen & Dr. Zhengui Zheng**

Department of Microbiology; Biological Science

*Neonatal Exposure of Bisphenol Analogues Disrupts Male Mouse Genital Development*

Bisphenol analogues (BPs) are commonly used in the production of everyday materials such as plastics and food packaging as well as dental sealants. Bisphenol A (BPA) is the most commonly used analog. It has been proven to be an endocrine disruptor. Early exposure to BPA interferes with normal neocortical development as well as synapse formation of the brain (Wolstenholme et al., 2011). In recent years, countries such as England and France have begun to limit the amount of BPA present in several of their products including baby bottles. Bisphenol S (BPS) is one of the most common supplementary chemicals that are used by manufacturers. As the presence of BPS grows in the environment, the exposure to BPA does not cease to exist. The issue being faced now is the presence of both BPA and BPS in the environment. Dr. Chen's lab is working with Dr. Zheng's lab to establish an effective dose for each BPA and BPS to determine what concentrations of these toxins produce effects in mice. Using this effective dose, we will combine the BPs to determine the scale of the synergistic effects these two compounds have on one another. Due to the nature of the BPs, we will expect to see larger effects on the male genital as a result of compounding these chemicals into a single dosage.

**Jordan Caylor and Harvey Henson**

Department of Geology

*Searching for Historical Structures at the 3<sup>rd</sup> Lincoln-Douglas Debate Site Using EMI Geophysical Methods*

On September 15 in 1858, Mr. Abraham Lincoln and Senator Stephen Douglas held their 3<sup>rd</sup> debate in Jonesboro, IL as a part of their race for a seat in the U.S. Senate. There are estimates as to where the debate took place, but the exact location is unknown. This project attempted to discover evidence of the exact location by detecting conductivity anomalies in the soil at the memorial site of the debate, which is also the most commonly accepted estimate of the location. The memorial site was surveyed with a handheld EMI (Electromagnetic-Induction) instrument to collect conductivity data which was later translated to mapping software and analyzed in the search for possible anomalies. Results of the conductivity data coupled with historical information indicates that the debate site did take place at the current memorial site, but there is no evidence of any remaining part of the debate platform. Although the EMI instrument did not detect any of the original material related to the actual debate, some anomalies were observed that may indicate other structures possibly related to this historic event.

**Landon Chandler, Dr. Julie Partridge, & Dr. Phil Anton**

Department of Kinesiology

*Perceptions of Strong Survivors staff members on their experience in the program.*

The Strong Survivors program (co-sponsored by SIH and the SIUC Dept. of Kinesiology) uses exercise as a therapeutic tool to help cancer survivors and caregivers get through their treatment and recovery period. Program participants are assigned to a Strong Survivors staff member who serves as their personal trainer, designing and overseeing their exercise program, which is individually based on the participant's current fitness/medical status, quality of life goals, and the results of an initial assessment (also administered by the staff member). Staff members are typically students from the Dept. of Kinesiology and have completed the Strong Survivors Staff Training Class (KIN 402). The staff members are able to directly relate knowledge gained in the classroom, as well as gain practical professional experience that they can apply in their future professions. Just as important, staff members are able to establish personal relationships with the participants and gain perspective from the cancer struggle that they endure. Little research exists regarding the experiences of persons in the role of cancer exercise trainer. Thus the purpose of this study was to conduct interviews with staff members past and present to provide insight into their experience in the program. Staff members were asked about their motivation for participation, the knowledge gained while they worked with the program participants, and the influence that their experience had on their lives, both professionally and personally. Numerous themes emerged, mainly related to the personal growth experienced by the staff members and the professional/post-graduation benefits realized from program participation.

**Won Jun Choi, Kexin Jiao, and Punit Kohli**

Dept. of Biochemistry and Chemistry, College of Science, Southern Illinois University  
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*Polymer micro ribbon for separation applications*

PDMS ribbons are formed by mixing silicone elastomer base and silicone elastomer curing agent. The mixture is then polymerized and finally oxidizing them in a furnace yielded polymer ribbons. The purpose of this research is to investigate the effect of PDMS ribbon dimension on oil-water, toluene/water, and chloroform/water separation behavior, and the effect of PDMS ribbon oxidation on separation behavior. The freshly made PDMS ribbons are nanoporous and hydrophobic. The surface functionalization of ribbons due to further oxidation may change the hydrophobicity and affect the water/oil separation. To test the effect of PDMS ribbon size on oil/water, toluene/water, and chloroform/water mixtures separation behavior, scotch tape was used to separate longer ribbons ( $\sim 0.8\text{cm} \pm 0.1$ ) from the shorter ribbons ( $\sim 0.3\text{cm} \pm 0.1$ ). The separation powers of longer and shorter ribbons were studied. The effect of ribbon oxidation on separation was performed by oxidative reaction at 380 °C to 460 °C for different duration ranging from 30 seconds to 5 minutes, and observations on the separation efficiency based on oxidation of the ribbons were made. We expect that longer PDMS ribbon with low oxidized component will provide a more efficient oil/water separation because of larger hydrophobic surface area of the PDMS ribbon for higher separation efficiency. The further experiment and major scientific problems that we are interesting in to better understand the separation mechanism of the PDMS ribbon, how strong the interaction between oil molecules and ribbon is to the surface, and how strong the entangling force is when PDMS ribbons tangle with each other.

Keywords: Cracks and fractures, PDMS, mechanical properties, Separation Mechanism

**Krystal Chung and Zhihua Du, Ph.D.**

Department of Chemistry and Biochemistry

*Studying the Interaction Between a Viral Core Protein and the Human Protein Caprin-1*

The focus of my research has been on the direct protein-protein interactions between the Japanese Encephalitis Virus (JEV) Core protein, a viral protein, and Caprin1, an RNA binding protein that plays a significant role in cellular proliferation, interferon-mediated antiviral innate immune response, maintenance of synaptic plasticity, and the formation of RNA stress granules. The lab has already proven that Caprin1 binds to FMRP, Fragile X mental retardation Protein, G3BP1, Ras-GAP SH3domain binding protein 1, and, the protein focused in on here, JEV. The shape of Caprin-1 had already been determined but the shape of JEV as well as the exact nature of their interaction had yet to be found. Once the shape of the JEV core protein was found it could be compared to the shape of Caprin1 to see how the two proteins best fit together. The proposed theory is that the two will bind together due to the existence of protein-RNA complexes. Protein-RNA complexes are not easily found because the two parts need to be folded perfectly, if even one fold is inverted or missing then the protein and the RNA will not bind. I hypothesize that this is identical to Caprin1 and the JEV core protein. The results of this experiment will lead to a greater understanding of the interactions between the JEV core protein, Caprin1, FMRP, and G3BP1 which could then be manipulated to change the effects of Caprin1 in cellular proliferation, synaptic plasticity, and formation of RNA stress granules.

**Brittan Cobb\*, Felicity Reiman\*, Judy Davie<sup>#</sup> and Amber Pond\***

Departments of \*Anatomy and <sup>#</sup>Biochemistry, School of Medicine

*Encapsulation of interferon- $\gamma$  by liposomes increases its persistence in the circulation of mice.*

Interferon- $\gamma$  (IFN $\gamma$ ) is a pro-inflammatory cytokine that is important for appropriate immune responses and is under investigation as therapy for a number of diseases. To treat with IFN $\gamma$ , it must get into the blood and persist long enough to be distributed to tissues; however, this small protein has a very short half-life *in vivo*. Therefore, numerous studies have been conducted to combat this issue. Encapsulation by liposomes has been determined to increase persistence of IFN $\gamma$  in the bodies of rodents. Here, we describe our pilot study of liposomal encapsulation as an effort to establish a model of delivering IFN $\gamma$  to mice so that this small protein persists longer in the circulation. Briefly, we coated the interior of a round bottom flask with a thin lipid layer. We then agitated IFN $\gamma$  in the coated flask at 41°C to create liposomes. We determined that the liposomes contained IFN $\gamma$  by removing the non-encapsulated protein, solubilizing the liposomes and assaying for IFN $\gamma$  by ELISA. We made liposomes without IFN $\gamma$  for control. We used laser spectrometry to determine that the particles ranged from 200-500 nm in diameter. Forty mice were injected: 20 with IFN $\gamma$  liposomes (15.15 ug IFN $\gamma$  per mouse) and 20 with an equal volume of control liposomes. Ten control and 10 IFN $\gamma$  treated mice were killed at days 2 and 4 each. We collected serum and assayed this for IFN $\gamma$ . After two days, four mice were positive for IFN $\gamma$  with a wide range of serum IFN $\gamma$  concentrations (215 – 1589 pg/mL). After 4 days, only 3 mice were positive for IFN $\gamma$ , with 2 having lower serum concentrations (10 and 15 pg/mL) and one measuring a very high 1754 pg/mL. The number of mice positive for IFN $\gamma$  needs to be improved. We believe that we can do this by improving our injection techniques.

**Jennyfer Cocom and Dr. Michael Hylin**

Department of Psychology

*Cortical Thickness, Hippocampal Volume, and Cell loss of in the Dentate Gyrus in a model of repeat close head injury*

Traumatic Brain Injury (TBI) is any damage done to the brain by external forces; it can occur in varying degrees, ranging from mild to severe, and can hold an effect on an individual long after the time of injury. The mechanisms of repeated TBI are still being investigated. Using a model of mild, repeated, closed-head injury, it was recently observed that multiple closed head injuries results in neurocognitive deficits similar to what is observed in patients suffering from repeated TBI. In this study, three-to-six month, C57BL/6J mice were utilized in three groups: a sham group (receiving no injury), a single, mild, closed-head injury group, and a group that received repeated mild close head injury. Subjects that underwent the repeated mild close head injury were injured once a day for four consecutive days. Subjects were euthanized 3 weeks following injury and their brain tissue was analyzed. Because closed head injury models result in no overt cell loss cortical thickness, hippocampal volume and cell loss of the dentate gyrus (specifically the hilus) were measured. Crystal violet was used to stain the tissue, and NIH Image J was used to determine volume and cell loss. From this data we will be able to determine if there is any damage to the cortex, shrinkage of the hippocampus in the absence of any overt cell loss. Further, we will be able to determine if cell loss occurs in the hilus. Through these studies we are able to examine the effects of mild head injuries upon neurocognitive processes and will be able to find more therapeutic ways to lessen or extinguish the effects of traumatic brain injury. Future research will be aimed at investigating how therapies aimed at improving cognitive function can affect the neuropathology that follow injury.



**Nathan Colley, Pamela Ubaldo, and Dr. Lichang Wang**

Department of Chemistry

*Illinois Coal for Solar Energy Harvesting and Conversion*

Dye sensitized solar cells (DSSC) are a new generation of solar cells that can compete with traditional silicon based solar cells. Although DSSCs are currently not as efficient as crystalline solar cells, they are cheaper to construct. DSSCs are composed of a dye stained metal oxide layer and an electrolyte redox couple that are sandwiched between two conductive glass plates. The dye absorbs a photon of light and becomes oxidized. It then injects an electron into the conduction band of the metal oxide layer. The electron is passed through an external circuit to the other conductive glass plate. The electron is then transferred to the electrolyte redox couple, which reduces the dye back to its original state.

The goal of this project is to develop new dyes for use in DSSCs while maintaining a relatively low production cost. Coal was used because it is abundant and inexpensive compared to metal based dyes that are widely used in DSSCs. Coal dyes were prepared using a variety of organic solvents to partially dissolve solid coal. Oxidation reactions were also done on coal to add carbonyl and hydroxyl functional groups, which act as anchors to adhere coal structures to the metal oxide surface layer. FT-IR spectroscopy was used to characterize the functional groups of the dye. The open circuit voltage and short circuit current were tested for each solar cell using digital millimeters. These points, along with the max power point, were plotted to generate an IV-curve. The efficiency of each DSSC was also calculated. Although the efficiency of coal based DSSCs is low compared to conventional DSSCs, it is significant that working DSSCs can be made utilizing a material as abundant and cheap as coal.

**Clance Cook and David Yepsen**

Paul Simon Public Policy Institute

*The people of Illinois longed for government officials*

The people of Illinois longed for government officials who understood their positions on political reform. The recent election of Republican Governor Bruce Rauner, the Democrats still maintaining control over other aspects of state government, shows the drastic change citizens are hoping will come to fruition.

A strong focus needs to be placed on the political reforms and these reforms would help the political corruption era by making it harder for government officials to take advantage of their positions. The policy changes should be viewed as paramount to the survival of the state. There was progress when the Illinois Reform Commission was made, by former Governor Pat Quinn and produced a 100 day report. It expresses the changes that must be in place in order to elevate aspects of political corruption in Illinois. Each section of this paper will detail a different aspect of the report and discern whether the state has made progress to correct the failed policies. The suggestions made, in the *Illinois Reform Commission 100-Day Report*, emphatically shows that Illinois is suffering from massive corruption from all aspects of state government. These violations are detrimental to the survival of the state. The issues of corruption in Illinois speak to the overall lack of ethics within state politics. Each decision carried out by state government impacts the lives of the citizens in that state. Each policy that is in place, however, that does the contrary would inherently go against the political; ethical ideals the United States and Illinois Constitution stands for and further promotes self-interest over the interest of the people.

**Yanyan Sheng and Kole Cralley**

Department of Counseling, Quantitative Methods, & Special Education  
Department of Computer Science

*Using a parallel processing on a one-parameter model vs. two-parameter model*

Item response theory is a popular approach used for addressing statistical problems in psychometrics as well as in other fields. The fully Bayesian approach for estimating item response models is computationally expensive. This limits the use of the procedure in real applications. In an effort to reduce the execution time, previous studies have developed a high performance Gibbs sampler for the two-parameter item response model via the use of massive core-based graphic processing units (GPU). This study focuses on the simpler one-parameter model by comparing its parallel implementation with that of the two-parameter model. The algorithms have been implemented in C using the CUDA library from Nvidia. Experiments are carried out to compare the execution times for simulated data with varying sample sizes and test lengths.

**Andrea Davidson**

Department of Psychology

*You're Hired! Using the Implicit Relational Assessment Procedure to Predict Evaluations of Job Applicants*

The Implicit Relational Assessment Procedure (IRAP) is a behavioral measure originally created to examine derived relational responding. Recently, the IRAP has also been used in other manners, such as assessing implicit biases. While explicit (self-report) measures have provided the field with a large body of research, it is not always clear if these measures are best at predicting a participant's actual behaviors toward the target group in question. The current study used the IRAP to assess racial implicit biases in a more behavioral manner as opposed to explicit, self-report methods. Additionally, this study provided participants with a collection of mock job applications, half of which contained portraits of African American applicants and half Caucasian applicants. A vignette describing the need to evaluate the applications was provided along with a set of questionnaires assessing perceptions of each application. The study design provides for a means to assess not only implicit racial evaluations but also the predictive validity of those evaluations for job applicants.

**Keywords:** derived relational responding, implicit cognition, IRAP, race, prediction, job applications

**Andrea Davidson**

Department of Psychology

*Examining Social Exclusion in Relation to Forgiving Behaviors*

Social exclusion is a prevalent interest within current research in social psychology. Social exclusion, in the present study, is an act in which a person excludes another person in a social context (Williams, 2007). The effects of social exclusion have numerous implications for real life and the results of this study may provide potential guidelines for future studies. There are many different aspects and perspectives of social exclusion and its influences on both the source of the exclusion and the target of the exclusion. Differences between the perspectives are very significant and thus, the two points of view have been separated into subgroups. The current study will explore an area of social exclusion in college students not addressed by previous research: the interaction between source based social exclusion and forgiving behaviors. The students will respond to a series of questions in a survey packet to provide a firm grasp on the relationship between the two variables in question. It is expected that the act of excluding a target person will lead to an increase in forgiving behaviors in subsequent situations.

**Cody Dawkins**

Craft Shop

*Start Seeing Salukis – SIU Community Creative Spirit*

The focus of this project is to distribute cement castings of Salukis Created by Under Graduate Assistantships as tools to promote community and campus unity by beautifying with a familiar icon of our area with creativity. The Salukis will be placed around campus departments and at local businesses to illuminate the presence of the mascot and our ties of the campus and town as a pride factor. Once a sponsors will solicit volunteers on an annual basis to paint and design their dogs in relation to the Homecoming celebration. Student organization or individuals may participate by volunteering to paint sponsors' Saluki displays. Volunteers who collaborate with local business owners may use the hours accrued in the project for scholarships Greek life. Sponsors will be able to request a theme for their sculpture to be painted in, or allow the student group to create their own theme. In addition we will organize an annual competition with students groups paired with a community sponsor to compete for the "Best dressed Saluki" Sculpture with recognitions given out during our Home Coming Festivities.

The success of this project will be measured by the increased number of student and community groups participating in campus and town events, as well as the number of Salukis successfully placed around the area.

**Tim DeKoster and Gregory W. Whitley**

Department of Zoology

*Tracking the Origins of Bighead (*Hypophthalmichthys nobilis*) and Silver Carp (*Hypophthalmichthys molitrix*) from the Ohio River*

The objective of this study was to determine the principal sources (the Ohio River, its tributaries, or Mississippi River) of Bighead and Silver Carp in the Illinois portion of the Ohio River, including sections of the river upstream and downstream of Smithland Lock and Dam. Our null hypotheses were that all rivers contribute equally to the Asian carp populations in the Ohio River, and that there were no differences in the proportion of fish from each source environment between species or between the sections of the Ohio River upstream and downstream of Smithland Lock and Dam. This study was the first to be conducted in determining which rivers were primarily responsible for supporting the expanding Bighead and Silver Carp populations in the Ohio River bordering Illinois. Twenty-three individuals of Bighead and Silver Carp (sizes ranging from 499mm to 902mm) were collected using pulsed direct current boat electrofishing. Fish were euthanized humanely using MS-222 sedative and stored on ice for transport to SIU (IACUC protocol #15-009). Stable isotope and microchemistry data from the center of the otolith (which reflects a fish's early life) was used to identify natal environment for each fish. Linear regression models were used to analyze data collected to assess associations of individual fish distributions with preexisting spatial water data collected from various river sources. The results showed that a majority of the fish originated from tributaries and that management practices should not solely be focused on the bigger rivers. Moreover, Asian carp management on the tributaries will be more difficult and all age classes should be targeted to effectively manage the populations of Bighead and Silver Carp.

**Andrew Derby and Dr. Michael Lydy**

Department of Zoology

*Do Fish Bioaccumulate Permethrin from Consuming Pyrethroid-Resistant Hyalella?*

Permethrin is a pyrethroid insecticide that has widespread suburban and agricultural uses, and it has been subsequently found in aquatic ecosystems. Permethrin is a neurotoxin, yet some populations of the aquatic amphipod, *Hyalella azteca*, have become resistant to permethrin by genetic alteration of their sodium channels to prevent permethrin from binding to these neuroreceptors. Therefore, pyrethroid-resistant organisms are able to accumulate more permethrin in their tissues without showing ill effects. Permethrin is hydrophobic and lipophilic, and it has the potential to biomagnify in predators, such as the fathead minnow (*Pimephales promelas*) when consumed. The goal of this project is to demonstrate if resistant *Hyalella* have greater potential to transfer permethrin to consumers than *Hyalella* that lack pyrethroid resistance. Two populations, pyrethroid-resistant *Hyalella* and non-resistant *Hyalella* were exposed to carbon-14 radiolabeled permethrin in water and then fed to fathead minnows. The resistant *Hyalella* accumulated and transferred more permethrin to the fathead minnows than the non-resistant *Hyalella*, because the resistant *Hyalella* were able to tolerate higher permethrin exposure concentrations. Our finding demonstrates the potential for permethrin biomagnification to higher trophic organisms due to resistant *Hyalella* populations. Potential effects of this exposure in fish include, but not limited to, increased lipid peroxidation, inhibited splenocyte proliferation, and reduced food intake and growth. This project underscores the need to assess and understand pyrethroid resistance in field *Hyalella* populations, because of the effects it can have on higher trophic organisms and ecosystems.



**Lauren DeRossett<sup>1</sup>, Austyn Frassato<sup>1</sup>, Dr. Sylvia Fromherz<sup>2</sup>, Dr. Andrew Sharp<sup>3</sup>**

<sup>1</sup>SI Bridges; <sup>2</sup>Plant Biology; <sup>3</sup>Anatomy

*Selective Expression of Channel Rhodopsin 2 in Proprioceptive Neurons Using the Parvalbumin Promoter*

Proper development of sensory and motor neurons is integral to the function of the peripheral nervous system, which enables normative operation in daily activity. Proprioceptive neurons, a type of specialized sensory neuron, enable organisms to experience a sense of orientation in relation to their surrounding environment. Chicken embryos are ideal model organisms for the study of developing proprioceptive neurons because their development mirrors that of a human fetus. To better understand the function and dysfunction of proprioception, it is essential to study the development of these neurons. This typically involves invasive means. However, new methods are available that are less invasive. Optogenetics utilizes heterologous expression of light-responsive proteins that can be evoked to change physiological functions via light activation *in vivo*. Among the sensory neuron population, the parvalbumin promoter only drives expression in proprioceptive neurons. To further the study of development and function, this promoter, coupled with a transposon-based system, can be used to drive stable expression of light-activated proteins in proprioceptive neurons. Standard molecular cloning techniques such as mutagenic PCR were employed to amplify and isolate the parvalbumin promoter sequence and replace the CAG promoter in a standard channel rhodopsin 2 expression plasmid, pPB-ChIEF-Tom, prior to transformation in *E. coli*. The resulting plasmid was named pPB-PARV-ChIEF-Tom. Embryonic day 2 chickens can then be injected with the transposon-based system containing pPB-PARV-ChIEF-Tom and CAGPBase. Stable expression *in vivo* will allow for the further study of proprioceptive development by enabling light-activated excitation of the proprioceptive neuron population. Further study of the function and dysfunction of proprioception can be conducted in the early stages of life by using this promoter to drive selective expression of light responsive proteins.

**Nicole Dethrow, Joe Cheatwood and Amber Pond**

Anatomy Department, School of Medicine

*The ERG1 K<sup>+</sup> channel is detected in skeletal muscle from aged rats and humans.*

Skeletal muscle atrophy is the loss of muscle mass and strength that occurs with muscle disuse, certain diseases (e.g., neuropathies, muscular dystrophy and cancer cachexia), and with normal aging. The atrophy of skeletal muscle can be very incapacitating. It can be especially debilitating to the elderly, interfering with their ability to care for themselves and live independently as well as leading to falls, severe injuries and even death. We have shown that one alternative splice variant of the ERG1 K<sup>+</sup> channel is up-regulated in the atrophying skeletal muscle of mice and contributes to protein breakdown in this tissue by increasing ubiquitin proteasome proteolysis (UPP). Further, using western blot, we have shown that the skeletal muscle of aged (16 months old) rats had a greater abundance of this ERG1 protein than young (2 months old) rats. Interestingly, ERG1 protein has not been reported in the skeletal muscle of humans. We hypothesized that this channel would indeed be detected in aging human muscle. To test this hypothesis, we first validated that our antibody would recognize human ERG1 using immunohistochemistry techniques with human heart. We then immunostained skeletal muscle sections from the rectus abdominis muscles of four elderly (average age 70 years) people. Indeed, we detected specific staining of the ERG1 K<sup>+</sup> channel in these sections. For future studies, we will immunostain and compare skeletal muscle from both elderly and young people.

**Dakota Discepolo and Dr. Erin Venable**

Animal Science Food &amp; Nutrition

*Validation of the decontamination protocol for FEMA disaster canines exposed to contaminants.*

Disaster Canines are often needed to work in environments that are dangerous and contaminated with a variety of toxic substances. However, little data is available validating the decontamination protocol that is utilized for FEMA canines when working in contaminated environments. The objective of this study was to validate the effectiveness of the decontamination protocol currently utilized by FEMA teams. A pseudo-contaminant was applied to seven dogs in a blinded study repeated with two treatment protocols. The contaminant used (oil-based Glo-Germ®) was applied to the canines in four locations (1) throat latch, (2) between shoulder blades, (3) inside right hind leg, (4) left hind paw. Each Canine completed a mock search scenario and reported to decontamination immediately. Protocol A (current field protocol used by FEMA teams) utilized stiff bristle brushes, non-specific pet shampoo, and a double rinse system. Protocol B utilized a rubber grooming brush, Johnson & Johnson's® baby shampoo, the addition of grating on the floor to remove dogs from the gray water, and a double rinse system. Pre and Post decontamination photos were taken for each contamination location and scored on a scale of 0-3 for decontamination reduction. The scoring system is as follows: 0=75% or more contaminant remaining, 1=50-75% contaminant remaining, 2= 25-50% contaminant remaining, and 3=25% or less contaminant remaining. Data were analyzed using PROC FREQ SAS (version 9.4) as a Chi Square for each treatment and location. Significance was set at  $p < 0.05$ . The data demonstrated that there were significant differences in the contaminant residue for Protocol A vs. Protocol B. Dogs washed using Protocol A were significantly dirtier ( $P = 0.0166$ ). In addition there was also an effect of location. When both Protocols were compared Areas 1 and 3 were dirtier and Areas 2 and 4 were cleaner ( $p = 0.0044$ ). Our comparison of the two treatment protocols suggest FEMA disaster canines may be more effectively decontaminated and therefore reduce the risk of cross-contamination to their human counterparts. If incorporated into practice the Protocol B changes may reduce the risk of contamination. The use of Protocol B should be used in larger controlled studies.

**Europe Doan and Judy Davie, Ph. D**

School of Medicine, Department of Biochemistry and Molecular Biology

*Investigating TCEAL7 as a tumor suppressor gene in the pediatric cancer, Rhabdomyosarcoma.*

Rhabdomyosarcoma (RMS) is the most common form of soft tissue cancer among children and young adults. There are approximately 350 cases in the USA every year. RMS is a highly malignant cancer that derives from skeletal muscle precursors that do not differentiate into normal muscle. The Myogenic Regulatory Factors (MRFs) are a family of transcription factors that are the main initiators for the terminal differentiation of skeletal muscle. It is thought that the MRFs are blocked from completing this task in RMS by unknown mechanisms. It is plausible that the down regulation of the transcriptional regulatory protein TCEAL7 may cause the inactivity of the MRFs or contribute to the oncogenesis of RMS. TCEAL7 is a candidate for a tumor suppressor gene in RMS. TCEAL7 is down regulated in many cancer cell lines, including 95% of epithelial ovarian cancer cell lines. The purpose of my study was to determine if TCEAL7 is down regulated in RMS cancer cells, and if so, determine what role TCEAL7 plays in RMS. I have found that TCEAL7 is indeed significantly down regulated in RMS cells, suggesting that TCEAL7 may be a tumor suppressor in RMS. I have found that over-expressing TCEAL7 in an RMS cell line causes a significant decrease in proliferation, a decrease in mobility, repression of anchorage independent growth, and a significant decrease in expression of Cyclin D1, a regulatory protein that acts as an oncogene in RMS.

**Maxim Dolecki and Frank Anderson, Ph.D.**

Department of Zoology

*Phylogenetics of Mesodon, a clade of eastern North American land snails.*

The genus of land snails known as *Mesodon* has ten described species, all of which reside primarily in the eastern United States. (Pilsbry, 1948) There has not been a significant amount of research done on this genus, and classifications of the species within it may be erroneous for two reasons: a large geographic distribution of certain taxa may represent multiple cryptic species, and a general lack of data for *Mesodon* genetics leading to conflicting trees. The goal of this project was to gather more DNA sequence data on *Mesodon* in order to contribute to a clarification of the *Mesodon* phylogeny. This was accomplished by gathering tissue samples from as many *Mesodon* species as possible and extracting DNA in order to analyze data from four mitochondrial gene regions: 12S, 16S, CO1, and cytochrome B. The resulting phylogeny will help clarify *Mesodon* taxonomy and will be useful in comparisons with phylogeographic patterns seen in other eastern North American species with similar niches (e.g., land snails, flightless arthropods, and small vertebrates).

**Druessel, Logan M; Bany, Brent M**

Department of Physiology

*Assessment of the Expression and Function of Atoh8 in Mouse and Human Decidualization*

Recent microarray analysis revealed that the expression of the basic helix-loop-helix (bHLH) transcription factor atonal bHLH transcription factor 8 (Atoh8) significantly increases in the implantation regions of the mouse uterus. To validate this, we conducted reverse transcription quantitative- polymerase chain reaction (RT-qPCR) analysis and confirmed there is a dramatic upregulation of Atoh8 mRNA levels in the implantation verses inter-implantation segments of the mouse uterus between days 5.5 and 8.5 of pregnancy. To further verify increased expression of this gene we verified there is an increased level of ATOH8 protein in the implantation segments of the uterus by Western blot analyses. The next question we wanted to determine where this increased Atoh8 expression occurred in the uterus and used in situ hybridization using DIG-labelled sense and antisense RNA probes. The control sense probes showed no signal while the antisense probe revealed a very interesting expression in the developing anti-mesometrial decidua during implantation. It appeared that expression transiently increased in the stromal cells undergoing decidualization. We are continuing our analysis of the expression of this gene in human endometrial stromal cells undergoing differentiation in vitro to see if this transient increase in expression is conserved in humans. If so we will determine function of this expression in decidualization using RNAi approaches. In conclusion, we have identified a new transcription factor that might play a role in the trans-differentiation of endometrial stromal fibroblasts into decidual cells (decidualization).

**Baylen Earles**

Department of Anatomy, SIU School of Medicine

*Investigation of the Blood Brain Barrier Permeability after Mild Closed Head Injury*

Previous research has shown that head injuries, such as concussions, can have detrimental and long-lasting effects on an individual. Repeated injuries lead to worsened effects; the mechanism underlying this process is unknown. The blood brain barrier (BBB) is a physical and functional barrier which is hypothesized to protect the central nervous system from toxins and other macromolecules. Even brief disruption of the BBB, such as may be initiated by a concussion, could lead to a cascade of negative events triggered by the entry of toxic molecules into the brain. The goal of my project was to assess whether mild closed head injury caused the BBB to open, and if so, to determine if repeated injuries exacerbated the effect.

Mild closed-head injuries were produced in briefly anesthetized three-to-six month old C57BL/6J mice using an impact device. BBB integrity was monitored with Evans Blue dye (2% solution, 0.25ml (I.P.)), injected at the time of injury. One and a half hours after the injury the mice were overdosed with urethane, intracardially perfused with saline, and their brains extracted. Evan Blue bound to brain proteins was measured spectrophotometrically. Data gathered to date indicate that even a single mild closed head injury is sufficient to open the BBB in our model. Currently, evaluations are being made on whether repeated injuries intensify this effect. In addition, future plans aim to determine how long the BBB remains open after injury, and whether this time course is affected by single versus multiple injuries.

**Miller Eaton<sup>1</sup>, Hansika Sirikumara<sup>1</sup>, Hassan Samassekou<sup>1</sup>, Dipanjan Mazumdar<sup>1</sup>,  
Thushari Jayasekera<sup>1</sup>, Laalitha Liyanage<sup>2</sup>, Marco Buongiorno Nardelli<sup>2</sup>**

<sup>1</sup>Southern Illinois University Carbondale Department of Physics, <sup>2</sup>University of North Texas  
Department of Physics

*Optical and Electronic Properties of doped-MoS<sub>2</sub>: Joint Theoretical/Experimental Study*

Substitutional doping of transition metal dichalcogenides (TMDs) is an attractive way of engineering their electronic properties. The dependence of optoelectronic properties of TMDs on the dopant is largely under-explored. In this work, we will discuss how different species affect the optical properties of MoS<sub>2</sub>. The electronic structure calculations of doped TMDs are carried out using Density Functional Theory with the recently developed ACBN0 functional, a pseudo-hybrid Hubbard density functional that is a fast, accurate and parameter-free alternative to traditional DFT+U and hybrid exact exchange methods [L.A. Agapito, S. Curtarolo, and M. Buongiorno Nardelli, Phys. Rev. X 5, 011006 (2015)]. We compare our ACBN0 predictions with measurement of the electronic and optical properties of pristine and niobium doped MoS<sub>2</sub> films synthesized via physical vapor deposition and characterized using spectroscopic ellipsometry and optical spectroscopy.



**Leah Edgerton & Dr. Phil Anton**

Department of Kinesiology

*Effects of Fatigue on Jumping Ability in Female Collegiate Volleyball Athletes*

This project examined the ability of collegiate volleyball players to sustain explosive power during repeated jumps. Volleyball players are asked to jump repeatedly on a frequent basis during a typical volleyball match and an examination of this activity could serve to shed light on ways to improve jumping endurance. We examined the time point at which fatigue typically set in during the course of these repeated jumps via the measurement of the vertical jump performance. Data was collected on 11 Division 1 volleyball players and at Davies Gym. The protocol consisted of the athlete performing a warm up of walking and dynamic stretching followed by a standing reach measurement. Following this they performed 15 jumps with rest intervals of 20 seconds in between jumps. Vertical jump height was measured using a Vertec measurement system. These results were analyzed and compared with published research regarding jumping ability and fatigue to understand how the body responds to repeated explosive movements. The athletes tested during this study performed in a similar manner to athletes from other sports where jumping is a frequent activity (basketball, soccer). These results may lead to the use of training techniques used in these other sports and will help researchers in the field of Kinesiology to further understand how the muscles of the lower body can be best utilized to help athletes perform better.

**Dustin Emig\*, Eric Miller, and Karla Gage**

Department of Plant Soil and Agricultural Systems

*Dose response study of Kochia scoparia to dicamba, glyphosate, and imazamox to test for herbicide resistance*

Kochia (*Kochia scoparia*) is a problematic weed of Eurasian origin, and has become the focus of management for many producers in the United States western Corn Belt. Kochia has been found in several counties in Illinois, and the plant has shown the ability to form multiple herbicide resistance (HR) to different sites of action (SOA). Therefore, the objective of this study was to investigate the dose response of a southern Illinois Kochia population to different application rates of glyphosate, dicamba, and imazamox to confirm its SOA effectiveness. These three herbicides are widely used in agriculture, and herbicide resistance to any one of these three chemicals would impact crop management programs. Applications of these three herbicides were applied at different rates. Imazamox was applied at 0.375 fl oz/a, 0.75 fl oz/a, 1.5 fl oz/a, 3 fl oz/a, 6 fl oz/a, and 12 fl oz/a. Dicamba was applied at 1 fl oz/a, 2 fl oz/a, 4 fl oz/a, 8 fl oz/a, 16 fl oz/a, and 32 fl oz/a. Glyphosate was applied at 4 fl oz/a, 8 fl oz/a, 16 fl oz/a, 32 fl oz/a, 64 fl oz/a, and 128 fl oz/a. Visual ratings of herbicide damage, based upon percentages of epinasty, chlorosis, and necrosis, were taken at 7, 14, and 28 days after treatment (DAT). At this point it is defined that this southern Illinois Kochia species has a level of susceptibility to become HR resistant to these three herbicides. Results conclude that there is HR resistance to Kochia with lower applications of herbicides following the 28 DAT ratings.

**Hayley Falat and F. Agustín Jiménez**

Department of Zoology, Southern Illinois University, Carbondale, IL 62901

*The Helminths of the Short-tailed Cane Mouse, Zygodontomys brevicauda (Rodentia: Cricetidae) in French Guiana.*

*Zygodontomys brevicauda*, or the short-tailed cane mouse, is a small sigmodontine rodent common to herbaceous groundcover of the savannas and pastures of northern South America including French Guiana, Brazil, Colombia, Costa Rica, Panama, Venezuela, and Trinidad. This mouse is nocturnal, terrestrial and omnivorous and is common in anthropogenic landscapes. *Zygodontomys brevicauda* is the natural reservoir for the Guanarito Virus (Arenaviridae), which is responsible for hemorrhagic fever. The goal of this manuscript is to inventory the metazoan parasites of *Z. brevicauda* to enable testing of the synergistic effects, if any, of metazoans and the Guanarito Virus. Necropsies were performed on the complete digestive tracts of fourteen rats collected in French Guiana to determine what parasites were present in each individual examined. The number of the parasites and their location within the digestive tract was catalogued and individual specimens were processed for identification. The helminths collected include *Syphacia sp.*, *Heterakis spumosa.*, *Hassalstrongylus sp.*, and an unidentified tapeworm, all found in the digestive tract. The filaroid worms *Litomosoides sp.*, were found in the peritoneal tissues. Ninety-three percent of the individuals were infected with at least one species, with an average number of 27 worms per short-tailed cane mouse. This study provides the first characterization of infections suffered by *Z. brevicauda*.

**Thea Fisk and Professor Bloom**

Department of Political Science

*Immigration and the Extreme Right in Europe*

Extreme right political parties in Europe have been steadily gaining ground in Europe. Various explanations have been proposed to examine their success such as group threat theory, electoral rules, dissatisfaction with mainstream parties, immigration, nationalism, terrorism, or the economy. In order to analyze these factors I employ a statistical analysis to test demographic and economic explanations (changes in foreign born population, unemployment, income, etc.). I also use survey data to study attitudes towards immigrants to identify any effects of perceptions of immigrant populations. I supplement my findings with a case study analysis of the political strategy of extreme right parties in France, Sweden, and Hungary. I examine their party platforms, media campaigns, and polling results to identify what the parties are exploiting and how successful they are.

**Taylor Flatt<sup>1</sup>, Marty Grawe<sup>1</sup>, Ryan Sample<sup>1</sup>, Michelle Zhu<sup>1</sup>, PhD, Matt Geisler<sup>2</sup>, PhD**

<sup>1</sup>Department of Computer Science; <sup>2</sup>Department of Plant Biology

*A Parallel Genome Assembly and Analysis System using Big Dog Cluster at SIUC*

The goal of this project is to create a High Performance Computing (HPC) infrastructure for large-scale genome data analysis. The parallelized computational pipeline includes multiple genome assemblers, user web interface, SQL database and statistical and graphical output to support fast and convenient genome analysis for biologists. Various computing and memory intensive tasks can be integrated and executed in an automated way to reduce human interference. There are three major objectives in this project. The first is to construct the parallelized process on a distributed system which significantly speeds up the assembly and analysis of the genome. Initial tests on moderately sized data showed a decrease in time from 3 days on a typical computer to 3 hours on the high memory nodes of the Big Dog cluster (i.e., SIUC newly purchased HPC cluster). The second objective is to provide the most accurate results possible. Running the data in parallel through many different assemblers will likely produce very different outputs. Running a BLAST efficiency analysis on our several outputs, we can construct a more complete picture than any one algorithm can produce. Then we will assemble the contigs using a CAP3 program to produce the final output. Our final main objective will be to create a web interface for easy integration with the parallelized system. This would allow researchers the ability to seamlessly access the cluster to view, modify, and create jobs for assembly. This approach allows researchers to easily select which assemblers and parameters they wish to use for the assembly of their data. The added benefit is that this approach requires little to no requisite knowledge of UNIX systems simplifying the process altogether. Ultimately, the project's focus on increased efficiency, accuracy, and accessibility for genomic research will hopefully make it easier for researchers to conduct their research.

**Alia Fleming and Dr. Michelle Kibby**

Department of Psychology

*Social Implications of ADHD and Depression in Children*

ADHD is a disorder which includes a tendency to be hyperactive, and to have trouble concentrating on present tasks. This disorder makes it difficult for children to carry on conversations and pay attention to activities with peers. Depression, on the other hand, is characterized by anhedonia, lack of energy, and negative mood and may also cause difficulty engaging with peers and making friends. The purpose of this study is to explore how the presence of depression and ADHD may affect the interpersonal relationships of children.

Archival data was used to address this, with 254 children between the ages of 8 and 12 years of age being included. They were divided into 4 groups: Group 1- Comorbid ADHD and depression; Group 2- ADHD, but no depression; Group 3- Depression, but no ADHD; Group 4- controls. ADHD was determined by a licensed clinical neuropsychologist using criteria from the DSM-IV. Depression was determined using the Behavioral Assessment Scale for Children, 2<sup>nd</sup> edition (BASC-II). “Interpersonal problems” values were determined with use of the “interpersonal problems” construct of the Children’s Depression Inventory (CDI).

It was hypothesized that children who suffer from comorbid ADHD and depression would have increased interpersonal problems, in comparison with controls. It was also hypothesized that those who suffer from either condition on its own would exhibit more interpersonal problems than controls, but fewer interpersonal problems than those with the comorbid condition.

A one-way ANOVA indicated that group means did in fact differ on Interpersonal Problems ( $F(3, 250) = 3.944, p = .009$ ). Children in the ADHD-only group had significantly more interpersonal problems than controls ( $P = .030$ ). Depression did not significantly affect interpersonal problems in this sample ( $P = 1.00$ ). Significance was not found for the comorbid group either ( $P = .094$ ).

**Martin Flores<sup>1</sup>, Jessica Whitaker<sup>2</sup>, Sylvia Fromherz<sup>3</sup> and Andrew A. Sharp<sup>4</sup>**

<sup>1</sup>Liberal Arts SIU; <sup>2</sup>Department of Physiology and <sup>3</sup>Plant biology <sup>4</sup>Department of Anatomy, SIU.

*Achieving Chief Expression in Astrocytes of Embryonic Chicks*

Proper development of the spinal cord requires interactions between neurons and glial cells. Astrocytes, a type of glial cell found in the spinal cord, are important in maintaining homeostasis of the adult central nervous system (CNS). While we know that the membrane potential of astrocytes plays a role in the regulatory functions of astrocytes in the adult CNS, the role of astrocyte membrane potential during development is unclear. In the last decade, the field of optogenetics has developed and allows for the molecular-genetic introduction of light-activated molecules into target cell populations of an organism. For example, our lab introduces DNA encoding for a light-activated cation channel (ChIEF) into neurons in the developing spinal cord. This allows for activation of neurons during embryogenesis. My project centers on being able to achieve expression of ChIEF in astrocytes, and not neurons, by replacing the current ubiquitous CAG promoter with an astrocyte-specific promoter, the GFAP promoter. Currently, we have achieved the completion of the gChIEF plasmid and are now working on achieving expression in the astrocytes of the embryo. As our plasmid contains sequence encoding for a fluorescent reporter molecule, we will be able to test for protein expression with fluorescence microscopy once expression is reached. Ultimately, we hypothesize that achieving ChIEF expression in astrocytes will allow us to manipulate the membrane potential of astrocytes. Further experiments using light to non-invasively manipulate the membrane potential of astrocytes will be performed to advance our understanding of the role of astrocytes in early neural development.

**Samantha Forehand and Thomas Fagerholm**

Department of Theater

*An Evaluation of Production Collaboration*

A difficult challenge that often occurs in theater is effectively organizing the production process. This includes a range of file types and sizes that need to be easily accessible to large groups of people. The goal of this research is to consider and establish a standardized organizational process that can be efficiently utilized by all members of the production team.

The first step was gathering data related to different file sharing options that are available and then selecting from those which would be the most effective choice for the Department of Theater. Through this research different options were tested by transitioning the current process into other programs and then exploring their capabilities. After evaluating what each program offered it became clear the OneNote has many features and a flexibility that would be extremely useful for theatrical collaboration purposes. These features range from file attachment methods to comment adding and viewing options which would drastically aid the manner in which information and ideas are shared. OneNote gives the production process the ability to sort through digitally stored comments, insert todo lists directly onto files, and many more specific features that aid in file storage and idea sharing. In order for these capabilities to be effectively used a presentation was generated to demonstrate the functions and capabilities that OneNote has and how they can be specifically applied to the way the department coordinates design and production. This research will be continually evaluated through semesters of use on Department of Theater productions and refined as production teams are given the opportunity to utilize OneNote and give feedback.



**Anna Frailey, Travis Neal, Erin Medvecz, and David Gibson**

SIUC Plant Biology Department

*Exploring allelopathic effects of two invasive species on seed germination*

Understanding how nonnative invasive species succeed in habitats is a growing field of research. Invasive species can entirely change the structure and function of an ecosystem. There are many hypotheses about how invasives successfully establish in new habitats so quickly, but a controversial mechanism being studied is allelopathy. Allelopathy is defined as the inhibition of seed germination, growth, or plant performance of a plant through chemicals released from another plant to further its own success. Japanese Stiltgrass (*Microstegium vimineum*) and Japanese Chaff Flower (*Achyranthes japonica*) are two invasive species that have had large negative impacts on Illinois native species. *Microstegium vimineum* is known to produce allelopathic chemicals in its leaves. However, *A. japonica*, while expected to also produce these chemicals, has not been studied in this context. I propose to examine how allelopathic aqueous extracts from the dead and fresh leaves of these invasives impact the seed germination of six species, including two grass species, *Bromus inermis* and *Panicum virgatum*, two species sensitive to allelopathy, *Raphanus sativus* and *Lactuca sativa*, and the invasives themselves. I hypothesize that germination of all species will be inhibited by *M. vimineum* and *A. japonica*, with the allelopathically sensitive species experiencing the greatest inhibition. I also hypothesize that the *M. vimineum* extracts will reduce germination rates to a greater extent than the *A. japonica* and the control. This study is important for the conservation of native Illinois habitats, could contribute knowledge for the allelopathic potential of *A. japonica*, and will further understanding of how allelopathic chemicals impact a variety of plant species.

**Andrea Francis under Mentor Edward Benyas**

Assistant of the Southern Illinois Symphony, Orchestra Klassics for Kids coordinator, B.M. of Music Education

*The Effects of Music Education Diversity*

This study analyzes how diversity among music education affects the development of a musician. Factors that were considered in this research includes musical ensembles, utilization of instrument, environment, the organization of the music ensemble, and the financial situation of the ensemble and individual.

This study will explore topics that contribute to the process of a musician's evolution. Topics included are how the differing stylistic genres of the musical ensembles has affected their versatility and fluency among the music community, how their instrument has affected their quantitative performance outcomes, how their rehearsal and performance environment (venues, time offered, etc) has shaped their preferences and opportunities, how the ensemble has ran and how it was organized, and how the financial situation of the ensembles and individual has affected the quality of the musical experience. The study will shine some light on how certain themes of diversity impact a musician's performance opportunities.

Among the results, I have recorded that certain ensembles are more fluent in a certain genre of music due to the exposure that the ensemble provided, i.e. jazz musicians are more attuned to chord changes than those who primarily play in a wind ensemble. Musicians who have gotten the chance to play in larger, more advertised venues received more funding for their ensemble from donors. These results are a fraction of my project, which is still underway.

**Paige Frankovich and Mark St. George**

WSIU Coordinating Producer

*Scholastic Hi-Q*

For my undergraduate assistantship I was the Coordinating Producer for the television game show, *Scholastic Hi-Q*, which airs on WSIU, a PBS affiliate. This show is watched and loved by many people. *Scholastic Hi-Q* is a high school game show about knowledge. 32 teams come in from all around Southern Illinois and fight with knowledge to come out the winner.

My job as Coordinating Producer is keeping the show on track each week. I have to organize how the show will be laid out, create content and contact the coaches of each team. Once the teams are in a certain spot on our bracket, I contact them for updates and reminders about when and where they will be playing. I also create certain questions that will be asked on the show. I create the media questions, which involve still, audio and video questions. The media questions are pop-culture or famous things, such as art, monuments and people from around the world. A lot of times, the teams have a harder time with the media questions than they do with the regular questions.

Along with the coaches and questions, I have to help round up the crew that makes this show possible. I have to assign jobs to the crewmembers as well as remind them each week about coming of the show. Making sure that everyone shows up, because everyone has a specific job and every job is important. While the game is running, I am the Judge. If someone says an answer that might be a little off and the host does not know whether it is correct or not, I have the final say. After the show, I organize the questions from the ones that have been used and the left over ones, to use in the future.

**Austyn Frassato<sup>1</sup>, Lauren DeRossett<sup>1</sup>, Sylvia Fromherz<sup>2</sup>, and Andrew Sharp<sup>3</sup>**

<sup>1</sup>SI Bridges, <sup>2</sup>Department of Plant Biology, and <sup>3</sup>Department of Anatomy, Southern Illinois University, Carbondale, Illinois

### **A Genetically-encoded Sensor to Measure Embryonic Neuronal Activity**

Proper neuronal function is necessary for normal embryonic development. The ability to study neuronal function is dependent upon the ability to detect neuronal activity. This is particularly difficult during embryogenesis. Traditionally, electrodes are inserted into the neuron, which is an invasive means of detecting and monitoring action potentials that can damage the cell. A fluorescent voltage-sensing protein such as ASAP-1 (Accelerated Sensor of Action Potential 1) is less invasive and possibly more accurate. ASAP-1 is an integral membrane protein which changes its fluorescence in accordance to membrane potential. Heterologous expression of this protein provides a means for optical monitoring in the sub-ms time scale. The purpose of this project is to develop an approach to better monitor embryonic neuronal activity using ASAP-1. The chick embryo was used as a model for spinal neuron expression of ASAP-1 because its nervous system development closely mirrors human development. The chick embryo is also nearly transparent and easy to manipulate. PCR mutagenesis was used to amplify the ASAP-1 open reading frame (ORF) from pcDNA3.1/Puro-CAG-ASAP-1 (obtained from AddGene) using mutagenic primers to introduce the necessary restriction enzyme sites, and the amplicon was subcloned into an expression plasmid (pPB-ChIEF-Tom, from which the ORF for ChIEF-Tom had been removed). Standard molecular procedures were used to construct the plasmid, which has been named pPB - ASAP-1. Initial optical voltage recordings from two embryonic day 6 animals suggest that membrane potential changes are able to be measured in neurons of living embryos *in ovo*. Optimizing techniques for expression and optical recording is in progress. Successful ASAP-1 expression will assist in providing an understanding of neuronal activity during embryogenesis and potentially expand our understanding of neuronal dysfunction.

**Elizabeth Geerling, Lan Hai and Prema Narayan**

Department of Physiology

*Determining if high testosterone levels cause metaplastic changes in the male reproductive tract*

Luteinizing hormone (LH) plays an important role in reproductive development. Males with a gain-of-function mutation in the luteinizing hormone receptor (LHR) undergo precocious puberty, Leydig cell hyperplasia, and have high testosterone levels, which result in a condition called familial male-limited precocious puberty (FMPP). Our laboratory has generated a mouse model to study FMPP, known as KiLHR mice. KiLHR mice become progressively infertile in spite of normal sperm count and motility. We determined that the progressive infertility is due to erectile and/or ejaculatory dysfunction. To determine the reason for the sexual dysfunction, histopathological analysis of the ampulla and penile body of wild type (WT) and KiLHR mice was performed at 8, 12 and 23-27 weeks of age. The normal columnar epithelium was replaced by pseudostratified columnar epithelium in the ampulla of KiLHR mice as early as 8 weeks of age. At 12 weeks, chondrocyte metaplasia in the penile body of the KiLHR mice was seen. We hypothesized that sexual dysfunction and the metaplastic changes in the reproductive tract of KiLHR mice is due to high testosterone levels. To test this hypothesis, we have inhibited but not completely eliminated testosterone action in KiLHR mice with silastic capsules filled with the antagonist, flutamide, or empty control capsules. Conversely, WT mice were treated with testosterone filled or empty capsules. The ampulla and penes from 8 and 12 week old mice were fixed in formalin and embedded in paraffin. Sections will be stained with hematoxylin and eosin. Histology of WT and KiLHR ampulla and penes will be examined for metaplastic changes.

**Miranda Gibson & Stephanie Clancy Dollinger, Ph.D. (Advisor)**

Department of Psychology

*Adverse Effects of Disrupted Sleep on Cognitive and Emotional Functioning in College Students Over a Semester*

Sleep is necessary to maintain physical, emotional, and psychological well-being. College students are the most vulnerable population to sleep problems and subsequent deficits. Alarming, as little as 2% of college students get the recommended eight to nine hours of sleep per night. The current study seeks to establish an association between sleep quality/sleep duration and cognitive abilities, academic achievement, and affect. Twenty-five student participants (13 male, 12 female) were assessed on these domains at two different times, once at the beginning of the semester and once at the end of the semester. Results indicate that sleep quality, especially daytime dysfunction, is significantly diminished as the semester progresses. Students scoring high on sleepiness are especially at risk for this and other deficits (e.g., lower positive affect, depression, stress level). These findings shed light on the great need for campus-wide sleep health promotion and education in college communities.

**Miranda Gibson, Stephanie Clancy Dollinger, Ph.D., & EiEi Hlaing, Ph.D.**

Department of Psychology

*Predictors of CPAP Compliance in Older Adults with Obstructive Sleep Apnea*

Obstructive sleep apnea (OSA) is a sleep disorder affecting 9% and 24% of middle-aged women and men, respectively. It is primarily characterized by intermittent, complete (apnea), and partial (hypopnea) cessations of breathing caused by a narrowing along the upper airway during periods of sleep. OSA has profound physical health effects including risk for obesity, cardiovascular disease, diabetes, high blood pressure, and poor overall health. The poor sleep quality of OSA patients is also associated with a decline in overall cognitive performance, visual and motor skills, memory, depression, social disengagement, and excessive daytime sleepiness. The most supported treatment for OSA is continuous positive airway pressure (CPAP), which uses individual-appropriate air pressure to prevent the blockage and collapse of the airways.

Unfortunately, only 70% to 80% of those diagnosed with OSA seek CPAP treatment. Only 45% to 55% of these individuals actually continue with CPAP treatment. The current study seeks to establish predictors of CPAP compliance by comparing OSA patients who exhibited long-term CPAP use to OSA patients who discontinued using CPAP. Results indicated that younger age, overall health, excessive alcohol use, excessive sleepiness and sleep disturbances, and attention deficits were significant predictors of CPAP compliance. Targeting these individuals who are at risk of non-compliance can help physicians and sleep professionals better educate patients about the benefits of CPAC, the negative effects of disrupted sleep, and better keep them accountable to staying with the CPAP intervention.

**Erika Glaub and Dr. Anderson**

Department of Zoology

*A molecular phylogenetic analysis of the sun stars (Solasteridae)*

Solasteridae (sun stars; Echinodermata: Asteroidea) is a group of sea stars found throughout the world's oceans. Evolutionary relationships within Solasteridae are poorly understood, and several monotypic genera have never been sampled for molecular data. Through a collaboration with an echinoderm researcher at the National Museum of Natural History, tissue samples have been obtained from a diverse sample of solasterids. I have extracted many samples of DNA from the tissue samples, ran them through the PCR machine and have collected their sequence data. With this I will estimate the phylogenetic relationships among solasterids. The expected results will be a more complete view of the evolution of this group of sea stars and will clarify the position of sun stars in the sea star evolutionary tree.



**Sean Gloss and Jared Porter**

Department of Kinesiology

*Biasing expectations negates focus of attention norms*

Previous research has demonstrated that focusing one's attention externally and at increasing distances from the body enhances performance of a ballistic action (Porter, Anton, & Wu, in press). Moreover, recent findings have demonstrated that biasing expectations also enhances performance (Lohse & Sherwood, 2011). The purpose of this study was to investigate how biasing performers' expectations while eliciting different attentional focus affects standing long jump performance. Participants were college-aged students with no prior jump training. Using a mixed methods design, participants completed multiple trials of a standing long jump following verbal instructions promoting different attentional foci. When participants were in the Internal condition they were instructed to, "focus on extending your knees as rapidly as possible." When participants were in the External-Near condition they were instructed to, "focus on jumping as far past the start line as possible." The start line was located directly in front of their feet. When participants were in the External-Far condition they were instructed to, "focus on jumping as close as possible to the cone." The cone was placed directly in front of them at a distance of 3 m. Participants completed two trials in each condition. In order to bias the participants' expectancy, each participant was told, in one of the counterbalanced experimental conditions, "you should have your best jumping performance in this condition." Results of the attentional focus factor revealed that both external focus conditions jumped significantly further than the internal condition with the External-Far condition jumping the furthest. When bias was introduced, jumping differences were not observed in either condition. Findings of this study indicate that the typical results observed within the attentional focus literature are negated when expectations of their performance are biased.

**Raven Gougis and Joseph L. Cheatwood**

SIU School of Medicine

*Brain GLP-1 Receptor mRNA expression after stroke in rats*

Gut-brain interactions have been understudied as potential mediators of neuroprotection following stroke. The enteroendocrine gut hormone glucagon-like peptide-1 is secreted into the blood stream by intestinal L cells in response to the presence of certain types of nutrients. In the current study, we used quantitative real time PCR to test the hypothesis that the mRNA for glucagon-like peptide 1 receptor (GLP1R) - the brain receptor for the gut hormone GLP1 - was upregulated after stroke in rats in our model. Further, we examined whether soy-containing diets affected *glp1r* expression as part of the mechanism through which they are neuroprotective.

## Demetrius Green and Novotny Lawrence

Department of Radio, Television and Digital Media

### *Too Black or Just Black Enough: Understanding the implications black-ish*

The prevalence of African American sitcoms in contemporary America has faded significantly since its peak during the 1990's. Having once been a cornerstone of black expression, the African American sitcom has now fallen into somewhat obscurity. ABC's *black-ish* (2014-Present) however, is able to create a modernized replication of prior successful sitcoms such as the *Jeffersons* (1975-1985), the *Cosby Show* (1984-1992), and the *Fresh-Prince of Bel-Air* (1990- 1996). Like the aforementioned sitcoms, *black-ish* provides images of a successful black family and makes issues of race the central focus in many episodes. The constant address of racial issues is significant because it allows audience members to see how racial disparities still linger within our society. Despite its political attempts at addressing the issues of race, *black-ish* creates a color blind world where blacks are the only people who acknowledge race as an issue and spends many episodes reinforcing stereotypes that are derived from racism. When the characteristics of *black-ish* are juxtaposed, it is difficult to infer whether or not the show is accurately representing the authentic black experience. On one side, *black-ish* is re-opening the door for African Americans to successfully address racial issues and showcase a positive image of family through situational comedy. However, its reliance on creating a colorblind world and usage of inferences that are derived from racism, at times, take away from the significance of its political characteristics. Does *black-ish*'s political expression bewilder audience members too much or does *black-ish*'s reliance on negative racial humor level out the political expression just enough? In this study, I examine the implications of *black-ish* and seek to answer the question whether or not *black-ish* is "too black or just black enough."

**Natalie Gulson**

Department of Animal Science

*Effects of Helicopter Travel Stress on Working Canines*

Disaster canines are often called upon to travel via helicopter during the course of a mission. No data exists that measures the impact of that type of travel stress on the canine's search performance. These dogs are critical in our emergency response system and better understanding of what stresses them is crucial to ensuring their maximum performance. Researchers from SIU teamed up with Florida Task Force One to evaluate the effects of helicopter travel on the working performance of FEMA disaster canines. Nine FEMA certified canines were hot-loaded onto helicopters and then flown for 30 minutes. Canines were monitored for heart rate, core body temperature, respiration rate, and visible signs of stress. Saliva swabs were collected to monitor changes in cortisol, a commonly identified stress hormone. After flight, canines were unloaded at a search site and were asked to complete a standardized search exercise to monitor the effect of the helicopter travel stress on their performance. Fecal samples were monitored for 3 days following the flight to identify any effect on fecal microbial DNA. The data presented will identify changes in the working canine associated with the stress of helicopter travel and will include recommendations for future training protocols.

**Marissa Gutkowski and Robin Warne**

Department of Zoology

*Gastrointestinal Microbiota Influences of Disease Vulnerability of Green Frogs and Wood Frogs*

Pathogenic infections vary across ontogeny and tend to be highest in larvae and decline through adulthood. Emerging evidence suggests that the symbiotic microbiome of animals often varies across ontogeny and likely plays central but underappreciated role in disease susceptibility. Larval amphibians for example, often exhibit a window of increased vulnerability to infection around the time of metamorphosis, which may be associated with the massive tissue and intestinal remodeling that occurs when these animals transition from tadpoles to frogs. We used two species of amphibians and a model disease system-ranavirus- a virus that causes widespread amphibian die-offs in the wild, to examine how the gastrointestinal (GI) microbiota influences disease vulnerability. First, we characterized shifts in the GI microbiota of green frogs (known to be resistant to ranavirus) and wood frogs (highly susceptible to ranavirus) during metamorphosis. To do so, we sequenced their intestinal bacterial communities using 16S rRNA genes. Next we attempted to change the GI microbiome of green frogs to be more similar to wood frogs by sterilizing egg masses using antimicrobial compounds. We then inoculated these “gnotobiotic” eggs with the GI microbiota of wood frogs. A subsample of control and treated green frog larvae were then exposed to a LD-50 dose of ranavirus, to test if altered microbiomes influenced disease susceptibility. We are also testing the reverse, by shifting wood frog microbiomes to that of green frogs. We found that the GI microbiome does vary across species, ontogeny, and may contribute to disease susceptibility.

**Jennifer Hall and Dr. Michael Hylin**

Department of Psychology

*Deficits in Repeat Closed-head Injuries in Developing Rats*

This study was conducted to examine the deficits displayed by rats with multiple concussive injuries. Thirteen rats at post-natal date 17 received one concussion each day for four consecutive days. The injured rats, a group of non-injured rats, or “shams,” and a group of rats with single concussive injuries were tested in many motor skill tests, and long-term and working memory task. Some of these tasks included the Morris Water Maze, the Narrowing Beam Walk, and the Rotor Rod. After the rats completed all the tasks, data was collected from the videos and researchers’ notes and analyzed to see the comparison between groups. This is a pilot study to explore the unknown area of concussive injuries during this period of development. Finding significant data can help scientists understand the resiliency of the brain during these periods and can determine better care for children who receive many concussive injuries due to accidents such as falling.

**Mary Sophia Hall and Emmanuel Nsofor, Ph.D.**

Department of Mechanical Engineering and Energy Processes

*Solar Powered Water Purification and Energy Storage*

Drinkable water is increasingly rare. Pathogens and pollutants contaminate most water supplies. Waterborne diseases lower the quality of life for billions around the world. Every year, millions die from these diseases. Water purification is therefore a vital field of research. Boiling water is a traditional means of water purification, but it is costly and produces further pollution. This proposal seeks to design a solar powered water purification system that also incorporates solar energy storage. Solar power is an abundant and clean source of energy. However, energy storage is important for its use because of its intermittent supply. Distillation is the chosen method of water purification for this design proposal because it removes all pathogens and nearly all pollutants from water. Stills act as replicas of the water cycle. Evaporated water leaves behind contaminants and resulting water vapor forms droplets on a condensing surface. These droplets roll down the condensing surface towards the channel designated for the removal of treated water. In a still, this channel is separated from the untreated water to prevent recontamination. Solar stills encounter issues in production of processed water when solar power is lessened or not available, such as during the night and in cloudy weather. The proposed design seeks to extend the productivity of a solar water still through the inclusion of energy storage in the form of a heat exchanger containing a phase change material (PCM). A phase change material is a substance which stores energy while it is in a particular phase, in this case the liquid phase. When the phase change material's temperature drops below a certain point, it solidifies. This phase change releases the stored energy in the form of heat which can be used to continue the distillation process.

**Sohaib Hameed, Emi Hayashi Park and Amber Pond.**

Department of Anatomy, SIU School of Medicine

*N-Terminus Truncated ERG1a K<sup>+</sup> Channel Does Not Modulate NF $\kappa$ B Activity.*

Skeletal muscle atrophy is a loss in muscle mass and strength that occurs with injury, disease states and normal aging. Protein degradation is a main contributor to skeletal muscle atrophy and this proteolysis is primarily a result of the activity of three proteolytic systems: calpains, cathepsins and the ubiquitin proteasome pathway (UPP). We have shown that the ERG1a K<sup>+</sup> channel contributes to skeletal muscle atrophy by up-regulating the UPP component E3 ligase, MuRF1. It is known that MuRF1 is modulated by the NF $\kappa$ B family of transcription factors and, therefore, we conjectured that ERG1a would affect NF $\kappa$ B activity. Indeed, we have shown that ectopic expression of *Erg1a* in mouse gastrocnemius muscle causes a decrease in activity of the NF $\kappa$ B activity. Further, we have shown that a non-conducting ERG1a channel pore mutant and the ERG1a N-terminus piece alone each decrease NF $\kappa$ B activity. Therefore, we hypothesized that truncating the channel N-terminus would not inhibit NF $\kappa$ B activity. To test this hypothesis, we ectopically expressed a firefly luciferase NF $\kappa$ B reporter and a *Renilla* luciferase reporter in the denervated gastrocnemius muscles of mice while expressing the truncated *Erg1a* channel in the left gastrocnemius muscles and an equal weight of a control plasmid in the right muscle. Mice were killed at days 0, 2, 4, 7 and 10 post-procedure. The gastrocnemius muscles were harvested, homogenized and assayed with a dual luciferase assay kit. We determined the ratio of firefly luciferase activity to *Renilla* activity (to correct for differences in transfection efficiencies) and then divided the left leg ratios by the right leg ratio per mouse as a measure of relative activity. At each time point, the left to right leg ratio was around 1.0. The data reveal that ectopic expression of the truncated *Erg1a* does not modulate NF $\kappa$ B activity. Thus, the summation of our data strongly suggests that the N-terminus portion of the ERG1a channel is the main protein domain responsible for modulation of NF $\kappa$ B activity.



**Kari Hammond, Dr. Benjamin Rodriguez, and Christine Breazeale**

Department of Psychology

*Emotion Regulation Strategies Related to Trauma and Life Stressors*

Post-Traumatic Stress Disorder is an increasingly common disorder affecting nearly 8.7% of Americans. A diagnosis of PTSD increases an individual's likelihood of meeting criterion for at least one other mental disorder by 80% (APA, 2013 p.276). The impact of PTSD throughout the lifespan of an individual affects nearly every aspect of functioning. Colloquially it is believed that every individual experiences and responds to negative life events in a unique way. The following study aims to investigate the relations between type of trauma, stressors, and emotion regulation strategies implemented to determine if rather there are predictable patterns of coping based on the negative event type. It was hypothesized that: (1) life stressors and traumatic events that are similar to each other in nature are expected to result in similar emotion regulation strategies, but will vary based on level of impairment; (2) the severity of emotion dysregulation will be dependent upon proximity to traumatic events; and (3) increased symptomology will be dependent upon the presence of interpersonal traumatic events. Participants were recruited through an Introduction to Psychology course at a mid-size, Midwestern university. Eighty-five students were included in preliminary analyses. Analyses have indicated initial support, in part, of the hypotheses, but continued work is needed to determine to what extent the findings support the hypotheses. Thus far, correlations have shown support for hypothesis two, with proximity of event leading to more severe symptoms of PTSD and an incidental finding of more maladaptive regulation strategies being correlated with severe symptoms. To examine hypothesis one a logistic regression will be used and a linear regression is planned for analyzing hypothesis three.

**Mariam Hashmi, Emi Hayashi and Amber Pond**

Department of Anatomy, School of Medicine

*Sciatic Nerve Transection Results in an Increase in NF- $\kappa$ B Activity and Gastrocnemius Muscles of Mice.*

Skeletal muscle atrophy occurs with disuse of muscle, several diseases (e.g., cancer, M.S., cardiac malady, and diabetes) and happens naturally with normal aging. It can be quite debilitating and is thought to be responsible for approximately 30% of deaths due to cancer. NF- $\kappa$ B is a transcription factor that is associated with increased protein degradation and skeletal muscle atrophy. Here, we evaluate the effect of denervation on NF- $\kappa$ B activity; hypothesizing that NF- $\kappa$ B activity will increase in the gastrocnemius muscles of mice after denervation. To test this hypothesis, we electro-transferred plasmid encoding an NF- $\kappa$ B Firefly Luciferase reporter and a plasmid encoding *Renilla* luciferase into the gastrocnemius muscles of 9 mice. After 24 hours, we performed sciatic nerve transection on the left legs of these mice, while performing only a sham surgery on the right. Gastrocnemius muscles were harvested from 4 mice (both legs) at day 0. The gastrocnemius muscles were harvested from 5 mice 4 days post-surgery. We homogenized all muscles and performed a dual luciferase activity assay on these homogenates. We determined the ratio of firefly luciferase activity to *Renilla* activity to correct for differences in transfection efficiencies and then divided the left leg ratios by the right leg ratio per mouse as a measure of relative activity. The data reveals that day 0 mice had an average NF- $\kappa$ B activity of  $0.87 \pm \text{SEM}$  and day 4 mice had an average of  $2.11 \pm \text{SEM}$ . Results indicate that the NF- $\kappa$ B activity increased 2-fold ( $p < 0.01$ ) after sciatic nerve transection, supporting our hypothesis.

**Mitchell Hauser, Aaron Weckhorst, Dominic Lucchesi, Brandon Gries, Tim Janello**

Automotive Technology

*Robinson Engine Project*

We are testing the Robinson Engine Cylinder and Camshaft designed to lower pumping losses, emissions and increase miles per gallon (MPG) of gasoline. The test vehicle is a 2013 Chevrolet Malibu equipped with a 2.5L variable valve timed (VVT) direct injected engine. To reduce pumping loss and make the engine more efficient, the design utilizes one intake valve with a short duration opening at the beginning of the compression stroke. The air fuel mixture is released into a chamber, lowering the compression pressure, cylinder heat and work energy needed to compress the air fuel mixture. By utilizing the chambers which are shared by companion cylinders, the resonance created by the gas movement allows the engine to use less energy for compression while retaining drivability and power. The camshaft design allows testing the engine at varying cylinder pressures by manually adjusting of the compression pressure. Then, using a calibration tool for the engine's control module the volumetric efficiency map is altered to allow the VVT to retard valve timing at certain engine loads to maximize the engines power and MPGs while decreasing emissions. The intake manifold runners that lead into the cylinder have been machined to allow the passages to be isolated from each other to allow the gases to move unencumbered in and out of the cylinders. One side leads to the external tanks and the other half is for the air to flow into the cylinder. The vehicle is being tested on a dynamometer following the strict federal Environmental Protection Agency's (EPA) Inspection and Maintenance (IM) 240 test procedures to simulate real world driving conditions. The IM 240 test procedures insure consistent and repeatable results. The gasoline consumption is measured by weight and then converted to volume. This allows for temperature compensation and a very accurate and repeatable measurement.

**Yahaira L. Heller and Rene F. Poitevin, Ph.D.**

Hispanic/Latino Resource Center

*The role of Latino resource centers for increasing student retention.*

Using Tinto's theory of social interaction – namely the claim that academic success depends a lot on the meanings individual students place on their interactions *between* the academic and social dimensions of their college education – HLRC is shifting its Spring programming to increase its share of events aimed at bridging the gap between academic affairs and student affairs.

The basic idea behind Tinto's account is that in order for academic success to be 'successful', universities must provide services that incorporate a holistic approach to education; developing programs that can integrate the social and the academic dimensions of student life into their everyday practice.

The overall research question behind this initiative is to look at the role of Latino resource centers in improving student retention. The starting hypothesis of this project is the intuition that if Tinto's ideas are correct, and programs that manage to incorporate academic/social components into their mission are the most successful ones at eliminating attrition, then the more HLRC's programming incorporates Tinto's approach, the more successful HLRC's work will be.

We intend to formalize this commitment to bridging the gap between the academic and the social through new programming aimed at expanding our leadership development and mentorship program (social engagement), together with our new Latino Studies Minor outreach campaign aimed at educating students on the new changes that make it easier to declare this minor.

We will use a modified version of the Survey of Entering Student Engagement (SENSE) survey to interview both students who participate in our events together with students who do not take part in HLRC events (this is our control group) in order to make sure we can provide useful comparisons in terms of what works and what does not work.

**Bradley Henning, Faculty Mentor: Dr. Jared Porter**

Department of Kinesiology

*The Effects of Playing Videogames on Motor Behavior*

Videogames have become a very active part of our society. With all of this attention, parts of the population believe that videogames are nothing but stimuli for violence and anger. Although limited, some research has shown that playing videogames can result in improved neurological function. For example, a recent study involving the use of videogames found significant gray matter increases in various parts of the brain associated with spatial navigation, strategic planning, working memory and motor performance (Kühn, Gleich, Lorenz, Lindenberger, & Gallinat, 2014). The results of that study suggest that videogames may possibly be used as therapeutic modality in the rehabilitation process and may serve as an alternative to physical rehabilitation. The purpose of this study is to investigate if videogames not only produce physiological changes, but also physical changes in motor behavior. Participants will include 40 undergraduate students recruited from the Southern Illinois University population. All participants will initially undergo a battery of base line tests and a pre-participation survey. Afterwards, participants will be randomly assigned into test groups: 20 participants will be assigned to the videogame condition and 20 participants will be assigned to the control condition. In the videogame condition, participants will come in and play a pre-determined game for 1 hour each day for three consecutive days. The control condition will not play the videogame, but will only complete the pre-test and three days later will complete the post-test. The post-test will include the same tests, which were done at the beginning of the study as a pre-test baseline measure. It is hypothesized that the group that is exposed to videogames will display an increase in motor behavior characteristics while those in the control group will not have any significant changes in motor behavior.

**Javier Hernandez, Dr. Buck Hales**

Department of Physiology

*Utilizing Epithelial-Cadherin to detect early stages of ovarian cancer in tissues*

Ovarian cancer is one of the most deadly gynecological cancers due to the lack of early detection methods, and when it is discovered it is in its late stages. The hen is a great model due to the spontaneous nature of ovarian cancer, which is similar in how it occurs in women. We and others have shown that an increase in epithelial cadherin (E-cad) is the first event in ovarian cancer. Therefore, we hypothesize that utilizing e-cad as a histological marker and analyzing the results would show which samples have ovarian cancer. Method: immunofluorescence to determine e-cad expression in tissue sections from hens suspected of having ovarian cancer. Results: The degree of epithelial cadherin corresponded to the presence and severity of ovarian cancer. Future studies will examine using soluble e-cad and determine the correlation between expression of soluble e-cad in serum and e-cad in cancerous tissues, thus having a possibility of a potential biomarker. This could then be used in women and be able to detect ovarian cancer at an early stage.

**Jessica Higginbotham and Buck Hales, Ph.D.**

Department of Physiology

*Qualitative analysis of collagen deposition in normal and ovarian cancer cells through histological staining.*

Epithelial ovarian cancer (EOC) is one of the deadliest gynecological malignancy as of the ~20,000 new cases yearly the disease and 72.5% of the women die. The high mortality is due to the lack of an effective early detection. Lack of experimental animal models has also hampered ovarian cancer research. The laying hen is the only natural animal model of spontaneous EOC that recapitulates the human disease. We can exploit the similarities between chicken and human EOC, providing a robust model for studying the initiation of carcinogenesis and progression. The Hales lab has previously demonstrated that flaxseed can reduce the severity of ovarian cancer due to the perturbation of the prostaglandin E2 (PGE-2) synthesis.

The major biologically active constituents of flaxseed are the omega 3 polyunsaturated fats (PUFA) and the phytoestrogen lignan in the hull.

Hypothesis: That one of the earliest events in ovarian cancer is deposition of collagen in the tissues causes the ovary to become fibrotic. Objective: To use a histological staining method to determine if there is an increase in collagen deposition and to determine if flaxseed diet reduces the collagen deposition.

Ovarian tissues from old cancer prone hens fed either control or flaxseed diets were processed for histology. The tissue slides were stained using a Gomori's Trichrome which contains Chromotrope 2R (which stains red blood cells and muscle red) and Fast Green FCF (which stains collagen green) then stained with hemotoxylin (which stains nuclei purple). The slides are deparaffinized and counter fixed in Bouin's Solution prior to stain. Collagen deposition is increased in ovarian cancer tissue. Increased collagen deposition contributes to fibrosis of accompanies EOC.

**Stephanie Hirschman and James Conder, PhD**

Department of Civil and Environmental Engineering

## **INTRAPLATE TECTONICS: A RELATIONSHIP WITH AFTERSHOCK SEQUENCES**

The type of seismic activity which occurs in the New Madrid Seismic Zone (NMSZ) is controversial and has been debated in recent studies. According to the Department of Natural Resources (DNR) in Missouri the NMSZ is the most active seismic area in the United States east of the Rocky Mountains. This zone extends along a 'z' shaped pattern through Missouri, Arkansas, Tennessee, Kentucky and Illinois. In this research project two main locations are compared: the NMSZ and the Balleny Islands. Both are intraplate and having initial earthquakes of devastating magnitudes. For this study the mathematical analysis of the Omori law is used.

The Omori Law is an empirically observed statistical tool and assess the rate of aftershocks utilizing a decay function. The Balleny Islands Earthquake near Antarctica occurred in March of 1998, has a distinctly observed aftershock sequence. In contrast, according to the DNR Missouri the NMSZ had a series of three to five major earthquakes which occurred over a two month period between Dec. 16, 1811 and Feb. 7, 1812. Thus, it is essential to cross-reference the two regions. Moreover, a notable study suggests that the NMSZ is still active and the sequential events following the main shock there do not fit the Omori Law for aftershock sequencing. Our goal in this study is to run this mathematical sequence for the undeniable aftershock seismic data collected from the Balleny Islands Earthquake and show whether or not it follows the Omori Law; and if the models calculated resemble those similar to the NMSZ's. This study is still ongoing and is currently in the process of running statistical models with parameters that fit each seismic zone.



**Natalee Hite and Michael Hylin, Ph.D.**

Department of Psychology

*Examination of dendritic morphology of neurons in the basal amygdala following social isolation*

Stress is a common aspect of day to day living. Social stressors, such as isolation, impact circuitry involved in emotional processing and memory storage. The central aspect of this study is to understand how areas known to be involved in stress related are altered in response to social stress. Neurons in the basal amygdala were analyzed with respect to dendritic growth and branching. Specifically for hypertrophy (increased) and/or atrophy (decreased) of the dendritic material present in neurons.

Twenty prairie voles at 90 days of age were separated into groups that were either continued to be paired with their sibling or were unpaired and remained alone in a cage for a period of 30 days. The unpaired prairie voles were kept in social isolation and did not have contact with any other conspecifics. Prior research has demonstrated that social isolation using this model results in anxiety-like and depression-like behavioral deficits. The brains of both groups were analyzed using the Golgi staining technique. Two hundred micrometer thick brain slices were individually analyzed for dendritic length, number of branch points, where the branch points occurred, and spine density in circuitry involved in stress responses. The results of the dendritic changes will provide further information about the effect of social stressors on stress related areas of the brain in rodent model.

**Anna J. Hooppaw and Derek J. Fisher**

Department of Microbiology

*Identification of ligands for the Chlamydia trachomatis Sensor Phosphatases RsbU and CTL0852 using a Fluorescence-based Thermal Shift Assay*

The Gram negative, obligate intracellular bacterial pathogen *Chlamydia trachomatis* is responsible for the most commonly reported sexually transmitted bacterial infection and is the leading cause of preventable blindness worldwide. It undergoes a unique biphasic developmental cycle where it differentiates from the extracellular, infectious elementary body into the intracellular, metabolically active reticulate body. We hypothesize that development is regulated, in part, by a partner switching mechanism utilizing two inner membrane located sensor phosphatases, RsbU and CTL0852. However, the signals regulating these proteins are still unknown. To enable high-throughput screening for sensor ligands, the putative periplasmic sensor regions of RsbU and CTL0852 were first cloned into the pLATE52 *Escherichia coli* expression vector to create N-terminal his-tagged recombinant proteins to enable affinity purification. As a positive control, the periplasmic domain of Tsr, a chemoreceptor from *E. coli* that binds serine was also expressed as a his-tagged recombinant protein. While the CTL0852 construct remains insoluble, purified RsbU and Tsr were obtained and tested in a fluorescence-based thermal shift (FTS) assay utilizing the fluorescent dye, SYPRO, which binds to denatured proteins. Ligand binding stabilizes proteins resulting in a shift in the melting temperature ( $T_m$ ), which is monitored by SYPRO fluorescence. In the presence of increasing serine concentrations, Tsr showed as much as a 6 degree increase in  $T_m$ . Initial screening of RsbU using ligands from Biolog PM plates showed a significant increase of  $\sim 5^\circ\text{C}$  in  $T_m$  in the presence of tricarballylic acid with minor increases ( $1\text{-}2^\circ\text{C}$ ) with various other compounds. Future efforts will include obtaining purified CTL0852 for use in FTS assays, as well as continuing high-throughput ligand screening for RsbU. Ligands will then be validated using alternative approaches and tested for their ability to alter chlamydial growth in a cell culture infection model.

**Robert Hosto, Eric Miller, and Karla Gage**

Department of Plant Soil and Agricultural systems

*Herbicide -resistance testing of common waterhemp (Amaranthus rudis)*

Illinois soybean production is of major economic importance, worth nearly \$6 billion per year. Minimizing competition from weeds in soybean is critical due to the potential of losses in grain yield. Sequential applications and widespread use of glyphosate have led to shifts in the weed population. Herbicide-resistant weed biotypes create complications in weed management, therefore, the focus of this experiment was to test the efficacy of glyphosate on segments of a weed population at a Southern Illinois University research site in Jackson county, IL. There were four sub-populations of common waterhemp (*Amaranthus rudis*) in four parts of the site: field 2 – northeast; field 2 – southeast; field 3 – northeast; and field 3 – northwest. Four different rates of glyphosate were applied to each population: 1/2, 1, 2, and 4x rates (1x = 0.75 lbs acid equivalent/acre). Plants were grown in a greenhouse until they reached a height of approximately 5cm, then herbicide rates were applied in a spray chamber. Visual control ratings were taken at 7, 14, and 21 days after treatment (DAT). At the 1, 2, and 4x rates the field 3 northwest population exhibited the lowest level of resistance with 4.2% of the plants exhibiting 80% or less damage caused by herbicide. The field 3 northeast population, at the same rates, exhibited the highest level of resistance with 75% of plants exhibiting the 80% or less damage caused by herbicide. All four sub-populations exhibited some level of glyphosate resistance, which will impact the way that the site is managed.

**Emily Jelinek and Jan Thompson**

Department of Cinema and Photography, Department of Radio, Television, and Digital Media

*alt.news 26:46: The Process of Students Creating Original Content*

Alt.news 26:46 is a student run magazine style television show that airs on WSIU. The objective of our show is to teach students how to produce their own short documentary segments. In order to achieve this, we hold workshops to teach students how to use a camera, how to light interviews, and how to record and monitor sound. Students research unique and interesting events or businesses to see what they want to film. After they have done sufficient research on their topic, staff members help them compose professional and concise emails to employers and potential contacts asking about filming a short documentary featuring their event. Once the employer has agreed, the student makes a list of questions designed specifically for the type of story they want to tell about the event. The student gathers a crew and utilizes the skills learned from our workshops to film their documentary segment. When filming is completed staff members aid the student in the post-production process. This includes showing them how to properly store footage, how to upload it into an editing program, and how to use that program to edit the footage into a well constructed and beautifully thought out finished piece that will then air on television. We have made four original episodes this academic year and will air two more before the end of the semester.

**Sarah Jilek, Brittney Frailey, Alexa Baczak and Allison Joseph**

Department of English

*Grassroots Undergraduate Literary & Arts Magazine*

*Grassroots Undergraduate Literary & Arts Magazine* is Southern Illinois University's premier undergraduate publication. This magazine provides all undergraduate students the opportunity to have their literary and artistic endeavors published. The magazine staff is made up entirely of undergraduate editors and volunteers. The three co-editors have been awarded undergraduate assistantships by the Center for Undergraduate Research and Creative Activities for the past two years. *Grassroots* publishes short fiction, poetry, novel excerpts, screenplays, graphic novel excerpts, comic strips, photography, paintings, sheet music, drawings, photographs of three-dimensional artwork, and more. The editors solicit submissions in the fall of each year, using social media and fliers to promote awareness, and publish the magazine each spring, after all pieces have been selected and have gone through the editing process. All accepted pieces are eligible to win the SIU Literary & Art Award, a cash prize sponsored by CURCA with three different categories: prose, poetry, and visual art. *Grassroots* also hosts the Devil's Kitchen Literary Festival each fall, a three-day event featuring readings, Q&A panels, a reception, and a book signing with well-known writers from around the country. *Grassroots* not only provides SIU undergraduates with the opportunity for paid publication—it also provides its staff with editing and publishing experience, as well as the opportunity to network with well-known writers and work closely with faculty members. It is partially funded by CURCA, the Fine Arts Activity Fee, and the English Department.

**Ren Jing and Andrey Soares, PhD.**

School of Information Systems and Applied Technologies

*Poster session voting migration from paper to an online platform using LimeSurvey*

This study seeks to alternatives of paper based voting for 2015 ASA Research Symposium and 2016 Undergraduate Creative Activities and Research Forum. Ideally, online voting could greatly promote efficiency and reduce resources consumed by traditional paper based voting, which requires considerable investments of materials, labor, and time to create, maintain, and dispose. With proper design, the following goals can be obtained: the online voting will be implemented in the form of a survey, mimicking the content and format of traditional voting. Two forms of survey will be open to the judges and the public separately, who can vote from their smartphones, tablets, laptops or the computers provided at the registration table. Two QR Codes will be posted to allow the judges and the public to enter the survey page with the QR code scanner on their devices; each judge will be assigned one token to enter the survey online so that the voting can be secured within designated judges only, and each token can vote a finite number of posters. The public will get one token with the restriction of one vote only. The rankings can be calculated within 30 minutes after the end of voting. The study adopts *LimeSurvey* as the tool to design the surveys. The survey has been implemented at one event in SIU and the users returned great feedback. The voting has been improved and is being used for the UCARF 2016.

**Matthew Gunn, Becca Johnson, Andrew Partain, Dante Migone, Harsh Ilapakurthi, Connor Vorreyer, Megan Yun, Ethan Gordon, Elizabeth Blalock, Lauren Russell, Bryce Benefield, & Megan Aiello, M.S.**

**David G. Gilbert, Ph.D., Megan Aiello, M.S.**

Department of Psychology

*The Effects of Mindfulness on Low to Moderate Anxiety*

Mindfulness-based cognitive therapies (MBCT) are treatments that attempt to increase present moment awareness, nonjudgmental thinking and acceptance of thoughts, feelings, memories, and physiological sensation. Current literature has shown brief mindfulness interventions may also lead to reductions in psychological distress and anxiety, as in the case of Cognitive Control and Rumination in Youth: The Importance of Emotion by Hilt et al., 2012. This study explores the effectiveness of MBCT on SIU college-aged (18-24 years) students with moderate to low STAI-Trait scores (scores <36) and its effect on attentional processing of threatening events. Participants ran a three-block mixed saccade with threat-based images (KDEF; Lundqvist, Flykt, & Ohman, 1998) and had their eye movement recorded using Arrington Computerized Eye Tracking Technology. The researchers hypothesized that mindfulness exercises would significantly reduce anxiety in college students with moderate to low STAI-Trait scores and that mindfulness exercises would reduce anxiety in participants in the Mindful Acceptance group more than the Physiological Mindful or Control groups. The significance of this study shows how mindfulness exercises might potentially reduce the influence of stress on performance in anxiety-provoking situations.

**Taylor Johnson and Cheryl Burke Jarvis, Ph.D.**

Department of Marketing

*'Experience'*  
*Recruitment for the College of Business*

The goal of this research is to find exploratory information concerning why College of Business students do not utilize the program 'Experience' for internships and career hunting. I conducted eight interviews last semester with students enrolled at Southern Illinois University in the College of Business. The participants were represented were either male or female and between the ages of 18 and 22 years old. Two students were chosen from each class of freshmen, sophomores, juniors, and seniors. Student's majors were also a component in choosing participants. Represented Business majors included Accounting, Marketing, Sports Administration, and Business Undecided. In conclusion, the program 'Experience' is no longer being expressed to the students of Southern Illinois University as it used to be in the past. Teachers and advisors have stopped mentioning it to their students, which has caused a decrease in activity on the site. However, those who are familiar with the program, which seem to only be upperclassmen, are not satisfied. I recommend sending attention grabbing emails, utilizing social media accounts, teaching students about the program in 400 level business classes, and creating incentives for students to use 'Experience'.

This semester I am working with the College of Business to developing a survey for current freshmen to help with understanding their decision process in choosing SIU and choosing Business. The survey will be administered each year to all our incoming freshmen, but will be pilot tested this semester with a couple of classes.



**Jared Jones and Michael W. Olson**

Department of Kinesiology

*Temporal Measures of Muscle Activation and Force Stabilization Before and After Static Loading of The Knee Joint Capsule*

Neuromotor response of the muscles surrounding the knee joint are vital to the maintenance of knee joint stability during contact with the support surface. Previous research has determined that loading of the knee joint capsule can induce laxity within the passive soft tissues within and surrounding the joint capsule. Purpose: To evaluate the muscle activation patterns of the muscle surrounding the knee joint and the forces acting upon the body during drop landings before and after application of a static load to the knee joint capsule. Methods: Ten health individuals ( $23 \pm 2$  yrs,  $75 \pm 10$  kg, and  $1.75 \pm 0.1$ m) participated. Participants performed maximal voluntary isometric knee flexion and extension efforts (MVIE) to determine the maximum torque and electromyography (EMG) prior to the initiation of the loading and landing sessions. Participants performed single leg drop landing from a height of  $\sim 30$  cm onto a force platform 10 times before and after static loading of the preferred/dominant limb. During the static loading session, the knee joint was positioned at  $30^\circ$  of flexion while participants were seated in an upright position. A load of 200 N (men) or 156 N (women) was applied horizontally through a tethered line secured around the leg  $\sim 5$  cm distal to the lateral femoral epicondyle for 10 min.

Participants were instructed to remain relaxed during this 10 min loading session. Surface EMG was recorded from rectus femoris, vastus lateralis, vastus medialis, semimembranosus, and biceps femoris muscle groups during all sessions. EMG were normalized to MVIE and monitored during the loading session to ensure muscle activity was minimal. These same muscles were assessed during landing trials onto the force platform. Temporal variables of interest with respect to the time of force platform contact included: peak EMG and vertical force stabilization. A one-way ANOVA was used to analyze the dependent variables between pre and post loading conditions. Alpha was set at 0.05. Results: Temporal differences were not present between conditions for any muscle group when observing peak activation ( $p > 0.05$ ), however there was a trend of increased delay response ( $p = 0.0626$ ) for the rectus femoris muscle group. Vertical force stabilization was not significant between conditions ( $p > 0.05$ ).

Discussion/Conclusions: Although there were no significant differences between pre and post-loading conditions a trend in the data were present to indicate that neuromuscular response may be delayed due to this loading scheme. Vertical force stabilization was not different, however, it is possible that forces in the anteroposterior and mediolateral directions may provide additional information.

**Trevor Jones & Aaron Scott**

School of Art and Design

*SAM Lab UGA - How this position is helping me help others.*

I am an Undergraduate Assistant working in the Subtractive and Additive Manufacturing Lab (SAM Lab) in the School of Art and Design. I operate and maintain 3D printers, laser-cutting machines, and vinyl-cutting machines to help students develop and create their designs and prototypes. Through the research and activities I have participated in with Aaron Scott, I have received a broad range of insight into the industrial design industry, modern production techniques, 3D CAD modeling, and prototyping techniques. Through this assistantship, I have taken part in focus groups and client-based projects, ideating and creating aspects of real products, some of which are due to become produced and sold. These activities have given me the knowledge I need to operate effectively in the field I plan to enter: Industrial Design. I have also done research on many aspects of material research, specifically relating to strategies that will increase economic and ecological sustainability within the lab, and have developed plans to expand these processes into the campus as a whole. These strategies will lower costs for students utilizing the the 3D printers, increase SAM Lab revenue, lower overall material costs for the SAM Lab, decrease plastic waste, lower the carbon footprint of our campus, and create a system where additional student research in additive production materials can be carried out. I have also begun further research on additive production techniques that incorporate bio-materials, and plan to begin proving my concept within the next few months. Once the feasibility is proven, I plan on incorporating this material into the 3D printing manufacturing process. This additional team-oriented bio-material research can only be carried out if additional grant proposals are accepted, which include the REACH Grant and the Green Fund. I am currently waiting on the results of these grants.

**Kristina Jordan, Nancy Garwood, & Kurt Neubig**

Department of Plant Biology

*A morphological and molecular case for hybridization of the species *Trema cubensis* & *T. micrantha* (Cannabaceae) on Hispaniola*

The pioneer tree *Trema* can be found growing in many areas throughout the Neotropics, including Hispaniola. Unfortunately, the taxonomy of species in *Trema* is highly unresolved; the species *Trema micrantha* (L.) Blume has highly variable leaf morphology and it encompasses multiple lineages that are distinct from the original description of *Trema micrantha*. Hybridization is one of the major contributing factors to this taxonomic confusion. A number of distinct molecular clades of *Trema* on Hispaniola grow in close proximity to one another, providing ideal conditions for interspecific hybridization. The purpose of this project is to determine, using a combination of molecular phylogenetic data and leaf morphological characteristics, whether or not *Trema* is hybridizing on Hispaniola. DNA sequence data analysis was used to evaluate the evolutionary relationships between species, and the measurements of morphological characteristics of leaves were utilized. We determined that *T. micrantha* and *T. cubensis* are naturally hybridizing on Hispaniola and that there are morphological characters that distinguish those species. Those traits are intermediate in the hybrid offspring. This is significant, as hybridization is a major force in evolution and, more specifically, speciation; this is a phenomenon that often gives rise to new species.

**Hong G. Jung<sup>1</sup>, William R. Taylor<sup>1</sup> and Adedayo A. Olugbade<sup>2</sup> Advisor: Sam Chung, Ph.D<sup>1</sup>.**

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*A Comparison of Java Development Environments for Beginners - Is the Cloud Cool?*

The purpose of this research is to examine how the cloud-based Java programming learning approach affects one of the important workforce skills, collaboration. One of the major concerns of a software company is the inadequate collaboration ability between existing software developers and the hired Java programmers immediately out of college. Software companies require collaboration as a necessary skill since software projects cannot be efficiently accomplished without teamwork. However, collaboration is absent in most of the college students being hired. Team collaboration has not been emphasized in the traditional beginning level Java programming. The used tools like Notepad or Integrated Development Environment (IDE) are running on a stand-alone workstation and do not support team collaboration with version control. No software architecture concepts were introduced to help the beginning level programmers to share high level abstraction of the programming with others as well. In order to bring collaboration to the beginning level Java programmers, we compare traditional and cloud-based Java programming environments. For the traditional Java programming environment, we choose Eclipse IDE and Visual Paradigm Computer-Aided Software Engineering (CASE) tool. For the cloud-based Java programming environment, we select Cloud9 cloud IDE and GenMyModel Cloud CASE tool. Participants, using the traditional approach, involve very little to no collaboration. However, the participants using the cloud-based approach demonstrate higher levels of collaboration. These results demonstrate that learning Java programming with a cloud based environment is the most beneficial approach for improving collaboration.

**Dakota Ray Justice and Gray Whaley**

Department of Anthropology

*Portrayals of Native Americans in American Movies.*

Has the Native American stereotype evolved since the “savage” that was shown in the early Westerns? This study analyzed contemporary Westerns as well as movies produced by Indigenous people in an attempt to answer this research question. The primary purpose of the study was to explore the depiction of the Native American stereotype in Hollywood films. The researcher explored the questions of if and how this depiction had led to a devaluation of American Indian culture and its significance in history. The researcher specifically investigated what effects ‘red facing’ and playing “Indian” in films has on viewers’ perceptions about Native people and their respective cultures. Red facing was defined as “the process and politics of playing Indian” (p. xii, Raheja, 2010). The concept of red facing was used as visual criterion for analyzing the movies. A total of five movies (3 - contemporary; 2 - indigenous) with Native American depictions were analyzed for this study. The results demonstrated that the image of Native American people has made some change overall. Furthermore, the result exhibited strong implications for observing how negative portrayals may affect next generation Native Americans self-identity, self-worth, and Non-Natives perceptions of them.

**Sondus Kahil, Briana Lucas, Mirian De Campos Costa, Arosha Loku Umagiliyage, and Dr. Ruplal Choudhary**

Department of Plant, Soil, and Agricultural Systems

*Total Phenolic Content and Chemical Composition of Jajki Laddu*

Jajki Laddu is a medicinal Laddu that is common to the rural areas in the Indian Subcontinent. It is commonly given for post-natal care to mothers of newborns. Since the body of new mothers is relatively weak after giving birth, Jajki Laddu is thought to have medicinal and nutritional properties that aids in faster recovery. By consuming Jajki Laddu, new mothers will supply their newborns with essential nutrients through the mother's breast milk. Consumption of Jajki Laddu is thought to offer several health-promoting properties. Ingredients in Jajki Laddu such as curcumin, dry dates, cashew nuts, lotus seeds, pistachios, wheat flour, clarified butter, licorice, and dry coconut give Jajki Laddu rich and functional components.

One kilogram samples of Jajki Laddu were obtained from central India. It was equally divided into two parts. One part was vacuum packaged in two types of packaging materials and its shelf life was evaluated based on its freshness and microbial qualities for 3 months. The second part was subjected to composition and nutrient analysis.

Compositional analysis revealed that Jajki Laddu contain 58% carbohydrates, 3.0% proteins, and 14% fat, that are essential for the energy demands of the human body. Results also showed that Jajki Laddi is a good source of phenolics based on total phenolics assay which was determined to 15.35mg GAE/g. The experiments performed provided us with essential information regarding the nutritional composition of Jajki Laddu. In the vacuum packaged Jajki laddu, no microbial growth was found until 3 months and it tasted fresh....

**Kelsey D. Kauffman and Craig Anz, Ph.D.**

Department of Architectural Studies

*Cross Disciplinary Designers*

In a globalized world, ideas must fluidly shift between languages, cultures, and different practice methodologies. In the ever changing world of design, new materials are being used in unique ways to create custom forms while designers are in the competitive chase with each other to be in the forefront of new design concepts and ideas.

One way that a designer can probe international contextual conditions to meaningfully incorporate cultural values, social practices, and vernacular traditions through the design process is to fully know the nature of the materials that are utilized in their projects. An intellection of a material and its limits will either positively or negatively affect how a consumer feels about a product or space.

If we are to truly understand how to utilize different materials in our specified practice, then cross disciplinary studies will need to occur. Once a designer is able to utilize their experience gained by cross disciplinary studies, they will be able to use unique materials for projects that may give the designer a competitive edge in the form of knowledge. When these designers are to receive their competitive edge through higher education, then the value of their education will raise to fortify the importance of a cross disciplinary degree.

The goal of the conducted research comprises of understanding the importance of cross disciplinary studies and the best majors to incorporate together as pertaining to architecture. Results of the conducted research conclude that interior design, construction management, engineering, and art are, thus far, the majors that architecture students across the nation are requesting a better understanding of, but why? Per submitting this abstract, results are currently inconclusive for a full understanding of what the best approach towards a cross disciplinary designer should be, but upon the date of the symposium results will be understood.

**Jayne Kelley**

Department of Animal Science

*Effect of Search and Rescue Work on Canine Core Body Temperature*

Working canines are often called upon to work for long hours with infrequent rest periods. Little data has been published monitoring the temperature of the dogs during work and the length of time associated with elevated core body temperatures. When dogs endure this working stress, the body releases the hormones epinephrine, norepinephrine, and cortisol. These hormones, if left in an elevated state, can cause immune, cardiovascular, gastrointestinal, and neurological issues. It is crucial for these dogs to be in a healthy condition because of their work in saving human and other animals' lives. Institutional Animal Care and Use Control approval will be finalized prior to the initiation of this study. In order to monitor the effects of work on the healthy adult canine, we will utilize 20 adult dogs trained in search and rescue disciplines measured against control. Core body temperature (CBT) will be assessed prior to, during, and following work episodes. Dogs will be randomly assigned to one of two groups (Work vs Non Work). Dogs will be housed with owner/handlers overnight and will have ad libitum access to water. All canines will be placed on controlled diet meeting NRC recommendations for nutrient requirements of dogs in heavy work. Core Temp® capsules will be used to record the internal temperature of the dog in real time. LS Means for each group will be analyzed as a paired Student's T Test using the MIXED models procedure of SAS with a Tukey's post hoc adjustment.



**Jeremy Y. Kim<sup>1</sup> and Shane Mueller<sup>2</sup> Advisor: Sam Chung, Ph.D<sup>2</sup>**

<sup>1</sup>Department of Automotive Technology (AUT), College of Applied Sciences and Arts (CASA)

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*Problems and Solutions of Current Automotive Cyber Security*

In this research, we seek to identify various ways that a vehicle can be attacked and propose how the vehicle can be secured from these attacks. With the great technological advancements in today's automobiles, vehicles on the road today are branching out into broader networks at a rapid pace. The introduction of new technologies including vehicle to vehicle communication, vehicle to infrastructure, vehicle to retail, and vehicle to the World Wide Web contain many opportunities for progress. However, with the expansion of connectivity, the amount of open areas for possible cyber-attacks increases proportionally as well. These attacks can be initiated by both hardware and software that may perform light attacks which cause your odometer to malfunction, or be as deadly as turning your brakes off in the middle of a freeway. For this purpose, we conducted literature surveys in order to create a comprehensive perspective of the problems and solutions in current automotive cyber security. We discovered that there are various ways of attacking an automobile such as external message injections, denial of service (DoS), and more. In order to find possible solutions to these attacks, we evaluate hardware encryption, firewall integration, intrusion detection systems, and digital certificates for present and future defense of automobiles against possible cyber-attacks from attackers. We found that the combination of the following defense mechanisms of hardware encryption, firewall integration, intrusion detection systems, and digital certificates are vital to defend an automobile from cyber-attacks.

**Keywords:** Automotive Cyber Security, Vehicle Network Protection, Hardware Encryption, Firewall, IDS, Digital Certificates

**Kevin Kleiman, Tara Webb M.A., and Reza Habib Ph.D.**

Department of Psychology

*Mindfulness and Impulsivity: Their Effects on Student Success*

This study examines the effects of impulsivity on student grades and the effectiveness of mindfulness as a mediator between the two. Specifically this study attempts to demonstrate a negative relation between delay discounting and overall GPA in a sample of introduction to psychology students by comparing scores obtained using an escalating interest task. Overall level of mindfulness obtained using the Mindful Attention Awareness Scale was compared to impulsivity score, to determine if an inverse relation exists between impulsivity and mindfulness in this sample of college students. The study is currently still in progress and results are not yet available.

**Zoey Koester and Chad Schwartz**

Department of Interior Design

*Typologies of Light in Religious Architecture*

Le Corbusier stated, "...architecture is the wise, correct and magnificent play of volumes collected together under the light," expressing that this design principle exposes the multi-faceted nature of built forms.(1) Light, or constant fluctuations in electric and magnetic fields which stimulate sight and make life visible, has incalculable value in the creation and experience of architecture. This prominent role arises from light's capacity to instigate unique visual and emotional sensations if effectively manipulated within a space.(2) While immensely important in all built forms, this phenomenon's power is particularly useful in the design of religious structures. In order to explore the interaction of light with form and materiality in the generation of spiritual spaces, this research examines a number of precedents – the Bruder Klaus Field Chapel, the Chapel of Reconciliation, the Chapel of Retreat, the Maria Magdalena Chapel, and Thorncrown Chapel – through a process of comparative analysis. Ultimately, the goal is to utilize this set as a baseline for a larger study aimed at classifying the typological methods of light manipulation commonly employed in the construction of religious structures. These patterns will demonstrate that variation in the introduction of light to space presents experiential opportunities for patrons.

**Ayush Kohli**

Department of Computer Science, University Honors Program

*Automating data wrangling to create better raw health datasets*

Health is a field that although has numerous amount of data but the data is difficult to use in order to come up with conclusions. Health data mining has been an extremely sought after topic for predicting outcomes or finding patterns from existing datasets. Unfortunately, many of the datasets are not suitable for data analysis in their raw form. This is due to the fact that some datasets are not prepared to be used for analysis and contain missing values. Moreover, their raw form sometimes may not be compatible with existing algorithms and hence, the dataset despite being so useful cannot be used for further processing. Data preprocessing is generally a very tedious task that sometimes has to be performed manually. Hence, data has to be wrangled (change their raw form) for it to be compatible with data mining algorithms. In this research project, a popular scripting language was chosen (Python) to script queries(SQL queries) to rearrange data. The dataset chosen was from the Medicare website. It was discovered that, it is indeed possible to automate data wrangling but still manual user input was required. This research approach can later be applied to other datasets or the dataset could be further cleaned for using it for data analysis.

**Sarah Kovac**

Department of Physics

*Analysis of Weakly Ordered Thin Films Using Fourier Transform Methods*

X-ray diffraction is the most developed method to investigate structure of solid systems with long range atomic order. Often understated, but is also useful to analyze weakly ordered (or amorphous) solids. In this effort we are developing atomic-level understanding of amorphous thin film such as boron nitride and silicon dioxide, fabricated in our lab, using high resolution X-ray diffraction technique. Theoretically we are utilizing the radial distribution function method to investigate nearest neighbor information and analyze the degree of ordering in such systems. Such understanding will help us formulate strategies to grow thin films with tunable order parameter in the future.

**Jonathan Lacey, Dr. Stephen Ebbs, and Scott Bradfield**

Department of Plant Biology

*Effect of Titanium and Silver Nanoparticles on Root Formation of Tradescantia zebrina*

The recent increase in engineered nanomaterial production has prompted the necessity for the investigation into how these materials may interact with biological organisms. Currently, the production of engineered nanoparticles (ENPs), is expanding at a rapid rate and has the potential to become a trillion dollar industry in the near future. It is projected that the production of TiO<sub>2</sub> ENPs will reach 2.5 million metric tons by the year 2025. Two of the most commonly produced metallic ENPs is TiO<sub>2</sub> and Ag, which is routinely used in a variety of applications such as: paints, medicine, cleaning products, clothing, sunscreens, cosmetics, and air/water purification. With increased production and use, comes increased potential for environmental exposure, both intentional and unintentional. Prior research with plants have shown TiO<sub>2</sub> NPs have the ability to translocate through the root and collect in the leaves. Presence of NPs have shown that TiO<sub>2</sub> ENPs have the ability to be taken up by the root and translocated to various other plant tissues. The presence of ENPs have shown effects on root growth potential and overall architecture. The current study seeks to demonstrate that TiO<sub>2</sub> and Ag suspension ENPs have the ability to travel via the vascular tissues to the stomata in *Tradescantia zebrina*. To observe the translocation of the ENPs, cuttings of each plant were taken and placed into a hydroponic solution allowing for root formation to occur. Once the formation of roots occurred, plants were exposed to the NP treatment concentration of 500 mg/L<sup>-1</sup>. The potential translocation effects were observed using a scanning electron microscope with energy dispersive spectroscopy to image the stomata.

**Aimee LePla and Seung-Hee Lee, Ph.D.**

School of Architecture, Fashion Design and Merchandising

*How is Social Media Affecting Millennials Fashion Shopping Behavior?*

In today's world of technology our consumers are finding new ways to shop. Social media has created a new way in how people access, receive, process and use information. Social media are online applications, such as Facebook, Twitter, Instagram, Pinterest, Youtube, and more, that can be used by large groups of users to disseminate ideas through social networking. Social media is different from other websites on the Internet in that it creates a highly interactive platform where individuals and communities share, co-create, discuss, and modify user-generated content. The generation that has been affected by social media the most at the moment is the Millennials. In a survey done on the generation, 37 per cent said they use social media as a way to research solutions to everyday problems and 57 per cent said that they would rather browse an existing social-media discussion, over an article, to learn more about a topic. With this new form of information sharing, companies are now being forcing to re model how they connect, and market to their customers. Social Media has become such a factor in purchase decisions that it is critical that we understand how Millennials use their Social Medias, in order to market to them correctly. Therefore, the purpose of the study is to generate information and find answers as to how and why Millennials rely on Social media as an influence in their shopping behaviors. To do so, one-on-one interviews with 30 Millennials, in a range of ages, genders, occupations, and races, will be conducted around the Carbondale area, as qualitative research. Based on the results, new fashion marketing strategies for Social media marketing would be suggested to companies in order for them to give their new age of customers a better, more up to date shopping experience.

**Noah Leverett**

Department of Health Education and Recreation

*Antecedents to Trust in Charity Sporting Events*

Trust in the charity has become one of the important components of successful fundraising programs (Sargeant & Lee, 2002). Trust has been found to have positive effects on donor commitment and satisfaction (Sargeant & Woodliffe, 2007). The purpose of this study is to examine antecedents affecting trust in charity sporting events (CSEs). CSEs are special events where participants raise funds for the non-profit organization while engaging in physical activity (Filo, Funk, & O'Brien, 2011). Morgan and Hunt (1994) defined trust as “the perception of confidence in the exchange partner’s reliability and integrity (p. 23). In this current study, trust is viewed as “CSE participant’s confidence in the charity organization’s reliability, integrity, and ability to perform.” In order to identify antecedents to trust, the authors conducted the literature review on trust in the non-profit sector. Additionally, they conducted interviews with CSE managers, cancer survivors, and CSE participants including the SIU students. Based on the literature review, the authors identified a number of factors affecting trust including *shared values, accountability, consistent communication, and customer satisfaction* (Garbarino & Johnson, 1999; Morgan & Hunt, 1994). The interviews with CSE manager and cancer survivors who participated in the Relay For Life event in 2015 indicated that there were the five main antecedents to trust, including *credibility of the non-profit organization, financial transparency, exposure to direct impact, and positive stores about the CSE*. In addition, based on the survey from 12 SIU graduate and 18 undergraduate students in the Department of Kinesiology who participated in CSEs in the past, the authors identified the following antecedents, including *exposure to direct impact/positive outcome, community integration, credibility of the non-profit, personal connection to the CSE’s mission and goals, positive experience of event participation, financial transparency, knowledge of past accomplishments, consistent communication between CSE participants and non-profit*. The authors plan to develop an instrument measuring antecedents to trust and conduct a series of surveys in constructing a scale assessing trust.



**John S. Lindt and Dr. David A. Lightfoot**

Department of Microbiology

*Genotypic and Phenotypic Variance in Soybeans*

As gene-mapping techniques have improved, the understanding of genes and gene expression has greatly increased. In soybeans, most genes are well mapped, but not all. One of the genes that is not thoroughly understood is the KAS-I gene. This gene is located on chromosome 5 within the protein and oil Quantitative Trait Locus found on Soybase (QTL; oil 10, 3, 13 and 35; protein 1, 2, 9 and 34), an interrelated gene cluster linked to marker Satt236 and Stt200. This QTL is believed to regulate certain aspects of oil content in soybean seeds. The KAS-I gene is believed to be responsible for regulation of many fatty acids including palmitic acid, a major fatty acid that is a component of soybean production.

There are two major ways to confirm this. The method to determine if KAS gene affects or regulates oil content and production. This would be done by comparing if there is both difference in genetic allele frequency (genotype) and oil content variation (phenotype) in different strains of soybean in terms of the KAS-I gene. Given these factors, the purpose of this research project was to determine if there was a difference of alleles and oil content for the soybeans studied. If there is both genetic variation and variation in oil content, it is hypothesized that the KAS-I gene has an effect on the regulation of palmitic acid. If there is one or both of these factors are not related. The results showed that there was variation of oil content and quality genetically and phenotypically. As such, the hypothesis that the allele at the KAS-I gene on chromosome 5 regulates oil content was supported. Soybean breeding will be made more efficient

**Robert M. Lockett**

Associate Provost for Academic Programs

*“SharePoint”*

The purpose of this study was to assess the usage and effectiveness of using SharePoint as a more effective method to track assessment reports/plans. During the summer 2015 semester, we started working with Dr. Arden Lockwood, assistant manager, Project Management Office, Office of Information Technology to streamline the way the Associate Provost for Academic Programs’s office functions.

Throughout the summer, fall and early spring semesters, we educated Dr. Lockwood and her staff on exactly what our office does, and maybe more importantly, who it affects. This was also a great learning opportunity for us, since we realized that we needed to make some revisions in our website, as well as in the ways we communicate our expectations regarding assessment to faculty and staff.

We are now in the process of creating forms in Sharepoint and will work with a group of volunteers to test the forms (i.e., Assessment Plans and Annual Assessment Reports along with the rubrics) during the spring 2016 semester. Training on using the forms/rubrics is also being planned.

**Lisa Logterman and Dr. Chad Drake**

Department of Psychology

*Exploring a Sentence-Completion Strategy With the Implicit Relational Assessment Procedure*

The Implicit Relational Assessment Procedure (IRAP) is a behavioral measure originally created to examine derived relational responding. Much of the published IRAP literature to date has focused on the assessment of implicit biases, especially in respect to a variety of topics that may be categorized under the domain of social cognition. While explicit (self-report) measures have provided the field with a large body of research on social attitudes, it is not always clear if these measures are best at predicting a participant's actual behaviors toward the target group in question. The current study used the IRAP to assess evaluative racial biases. In particular, a novel strategy for stimulus presentation with the IRAP was explored, such that trials within the procedure resembled a sentence completion paradigm more than the typical approach to IRAP trials involving the selection of answers to questions (e.g., responding "true" or "false"). Furthermore, this study provided participants with a collection of mock job applications, half of which contained portraits of African American applicants and half Caucasian applicants. A vignette describing the need to evaluate the applications was provided along with a set of questionnaires assessing perceptions of each application. The study design provides for a means to assess not only implicit racial evaluations but also the predictive validity of those evaluations for job applicants.

**Sarah Luebke and Maria Claudia Franca, Ph.D., CCC-SLP**

Communication Sciences and Disorders Program – Rehabilitation Institute

*Using Adaptation to Reduce Cognitive Load in Foreign-accented Media Presentations*

**Introduction:** Accent modification is a growing field of service within speech-language pathology that trains clients to lessen differences in accent, which may cause miscommunication. With online courses and teaching materials becoming increasingly prevalent worldwide, the need for educational research involving efficient and effective cross-cultural communication is imperative for its success. Previous work of Mayer, Sobko, & Mautone (2003) on the understanding of foreign-accented media presentations suggests that media is best understood when presented in the learner's native accent. However, research by Clarke & Garrett (2004) suggests that the effects of an unfamiliar accent may be minimized by allowing for a period of adaptation to the novel accent prior to exposure to relevant material. This study seeks to determine whether the decreased understanding of accented speech can be lessened by an adaptation period and if familiarity of an accent increases understanding.

**Method:** Participants consisted of 127 students from a Midwestern university, randomly divided into five groups. They watched a foreign-accented media presentation about lightning formation which included an introduction and a lesson (i.e., intro-lesson). The presentations included audio in standard American (S), Indonesian (I) and Nigerian (N) English accented speech. The five groups included intro-lesson combinations of S-S, I-I, N-N, S-I, S-N. Participants answered five questions about the lesson and completed a survey assessing prior accented speech experience.

**Results:** Lower scores associated with tests requiring transference of information indicated that a presentation in accented spoken English increased cognitive load. However, a period of adaptation implemented prior to the lesson in the same accented English appeared to increase scores to levels not significantly different than typically expected in a presentation narrated in standard American English.

**Conclusion:** Findings suggest that the negative effects on transference caused by foreign accent in media presentation materials can be partially reversed by giving participants an adaptation period.

**Lea M. Matschke and Derek J. Fisher**

Department of Microbiology

*Effect of Bacterial Two-Hybrid System Protein Tags on the Activity of the Chlamydia trachomatis Phosphatase CTL0511*

*Chlamydia trachomatis* is a Gram negative, obligate intracellular bacterium responsible for numerous human diseases, including trachoma and the most common reportable sexually transmitted infection in the United States. *C. trachomatis* has a biphasic developmental cycle alternating between the infectious form known as the elementary body and the replicative form, termed the reticulate body. We hypothesize that bacterial differentiation is mediated by protein phosphorylation and have recently characterized the biochemical properties of the pan-chlamydial PP2C-type protein phosphatase, CTL0511. Discerning protein substrates of CTL0511 is essential for determining its physiological function and identifying inhibitors. Bacterial two-hybrid systems are commonly used to identify protein binding partners and enzyme substrates. In two-hybrid systems, an interaction between two recombinant- proteins leads to activation of reporter genes resulting in an easily observable phenotype such as color change when the bacterium is grown on an indicator medium. Work with recombinant-CTL0511 has indicated that certain protein tags inhibit phosphatase activity, which would prevent CTL0511 from interacting with substrates. Consequently, we tested two different bacterial two-hybrid systems, the Bacterial Adenylate Cyclase Two-Hybrid (BACTH) System (Euromedex) and the Bacteriomatch II Two- Hybrid System (Stratagene), to assess the effect of the system-required protein tags on CTL0511 activity. Various N- and C-terminal tagged CTL0511 constructs were made and expressed in *Escherichia coli* grown under different conditions. CTL0511 phosphatase activity was measured from crude bacterial lysates using a pNPP hydrolysis assay. CTL0511-specific phosphatase activity was not detected with the BACTH protein tags. In contrast, the Bacteriomatch-tagged CTL0511 retained phosphatase activity. Future work will utilize the Bacteriomatch system to identify CTL0511 protein substrates.

**Kesia McClellan, Faculty Mentor: Dr. Lisabeth DiLalla**

Department of Psychology

*Believe or Not Believe? Theory of Mind and Peer Interactions In Twins*

The purpose of this study will be to examine relationships between theory of mind and altruism, prosocial behaviors, and peer problems within sets of twins from a longitudinal study. Theory of mind is important for a child to develop in order to interact with other children in a positive manner. Archival data from sets of twins that came to the lab at ages 3 and 4 will be used to examine their theory of mind development. Theory of mind tasks were administered twice to each child and scored as either pass or fail. Archival data along with newly collected data will be used at age 5 when they return to the lab a year later to be tested. This time, I will examine altruism by asking them if a toy left behind from another child should be mailed back to the child who left it or that child should keep it. Also, they will be asked to finish the story in a series of pictures of children in social situations in order to assess their prosocial responses. To examine whether any of these factors impact peer problem behavior, the parent-rated Child Behavioral Checklist will be used to examine peer problems. Children's zygosity (MZ or DZ) will be determined. I hypothesize that children who have developed theory of mind by age four will show greater altruism and prosocial behaviors at age 5, therefore leading them to have more positive interactions with their peers at age 5. I expect that girls will score higher on altruism, prosocial behavior, and theory of mind. Similarly, I expect that MZ twins will be more similar to each other on theory of mind, prosocial skills, and altruism than DZ twins, which will mean that these behaviors are heritable.

**Matt McNeer**

Department of Plant Biology

**Germinating *Lespedeza cuneata* seeds in the laboratory setting**

The objective of this experiment was to determine a methodology to maximize germination of seeds of the invasive species *Lespedeza cuneata*. Germinated seeds can then be used in further research. Since *L. cuneata* seeds have a rather hard seed coat, it can be difficult to use standard means of getting seeds to germinate. An experiment was set up using three different treatments, to see which one would produce the highest germination at the end of a two-week time period. An acid treatment soaked seed in 95 % concentrated 17.1 M Sulfuric acid at three concentrations: undiluted acid, 75% diluted (12.825 M) and 50% diluted (8.55 M) with DI H<sub>2</sub>O. A scarification treatment used three different types of sand paper: coarse, medium and fine. A heat treatment exposed seed for 60 seconds at 60, 80 and 100 degrees Celsius, respectively. All trials were replicated three times for a total of 30 seeds being tested for each type of treatment. After treatment, 10 seeds per replicate were placed in a labeled petri dish with filter paper moistened with DI H<sub>2</sub>O. It was found that seed germination was highest following fine sandpaper treatment with 83% seeds germinating at the end of two weeks. By contrast, only 43% and 30% seeds germinated following medium or coarse sand paper treatment. The heat treatment of 100, 80, 60 ° Celsius led to 50%, 26% and 6.6% germination, respectively. No seed germinated following the sulfuric acid treatment. Likewise, there was no germination in untreated seed under control DI H<sub>2</sub>O conditions.

**Shannon McQueen & Alessandro M. Catenazzi**

Department of Zoology

*Disentangling cryptic Peruvian Anurans with molecular techniques*

Currently, morphology is the most common way to identify species but there are molecular techniques that improve the process of identifying species, especially cryptic species that may be morphologically indistinguishable. Much like how retail barcodes use lines to differentiate products on the shelves, this type of barcoding uses the four nucleic acid in a short strand of DNA to differentiate species. The Barcode of Life project provides an additional tool for taxonomists to identify species that are similar in morphological features. We used this approach for many of the amphibian epidermal swabs that have been collected in Peru for disease research. The process amplifies the CO1, 16S and 12S genes extracted from swabs using PCR, which are then purified and sent to a laboratory to be sequenced. The forward and reverse sequences are then assembled and matched against the Genbank database to determine if the species is known. This database provides dynamic information that is constantly updated by users, improving taxonomic work by making possible to identify juveniles and badly damaged specimens using genetic sequences instead of morphology.. This work has allowed the identification of at least three previously unrecognized species in a region of southern Peru, and will support the description of these new taxa.



**W. Meador with D. Morris**

Aviation Technologies

*Working Towards a Small and Efficient Turbine Engine*

The current technology of internal combustion engines is trending towards becoming ever smaller and more efficient. Aviation in particular is focused on increased reliability along with reduced weight and fuel consumption. Turbine engines fill many of these needs with long operating lives high power to weight ratios and in the largest engines low fuel consumption. However this is not true for the smaller engines as size is reduced efficiency suffers. One potential solution is the use of positive displacement designs instead of traditional axial or centrifugal technologies.

The use of positive displacement pumping for a Brayton cycle engine has been proposed before. However many of the issues with this design have to do with the size of the components necessary or the sealing involved. However the modern turbine operates at a high rotational speed we propose to overcome these issues using that idea.

The focus of our research is on the design and creation of a small highly efficient turbine engine based around the Gerotor. Progress so far has been to finalize a prototype design and begin prototype

**David Mersman, Joseph Narusis, Emily Neuhoff, & Rhonda Kowalchuk, PhD**

Department of Psychology

*Relationship of Grit with SLPI Subscales and Retention for Engineering Leadership Program*

Little research has examined the relation between the Student Leadership Practices Inventory (SLPI; Kouzes & Posner, 2006) and the Grit Scale (Duckworth et al., 2007), and there has been some research on the Grit Scale and retention. In the current study, students from the College of Engineering in the Leadership Development Program (LDP) and a peer group of students not in the LDP at Southern Illinois University (SIU) completed scales. The current study utilizes archival data, and only the data from the students in the LDP will be examined. Students are junior status and about 60 participants will be examined. Three simple regression tests will be used to compare the Grit Scale and three subscales of the SLPI: model the way, inspire a shared vision, and challenge the process. Additionally, logistic regression will be used to measure the relationship between self-reports of grit and retention in the program. It is hypothesized that the Grit Scale will be positively correlated with model the way, inspire a shared vision, and challenge the process. Higher scores on the Grit Scale will also predict student retention in the LDP. There is further data entry that needs to be done, and the results will be included on the final poster.

**Gabrielle Morris and Valerie Boyer**

Rehabilitation Services Program

*PECS Implementation Training at the Center for Autism Spectrum Disorders*

The use of the Picture Exchange Communication System (PECS) as an augmentative and alternative communication (AAC) system is an established system for promoting functional communication in children with autism spectrum disorder (ASD). It is important when implementing PECS to ensure the individuals implementing are doing so with fidelity. The research question targeted in this investigation was whether a behavioral skills training model was sufficient for instruction of PECS administration or if a task analysis would be helpful to assist student clinicians in the fidelity of administration. I hypothesized that a task analysis would be beneficial for fidelity of administration. This study is a multiple baseline design across participants. The participants are two graduate students who are currently working at the Center for Autism Spectrum Disorders (CASD). Prior to baseline, a behavior skills training (BST) was a on the proper utilization of PECS. This is then followed by using the task analysis for each phase as the intervention. Data collection is still ongoing.

**Leslie Murray and Randall Auxier**

Department of Philosophy/International Studies

*Calling for Change: Learning How to Put People and Environment First*

This project shows that cell phones are a beneficial tool, but they are also an environmental disaster. Obtaining the raw materials, manufacturing, delivery, and continued use of the cellular phone requires a wide variety of global industries. The entire process is heavily laden with environmental degradation and clearly lacks consideration for large populations of humans and other species. This research shows the need for developing sustainable methods at every phase of this product, if we wish to behave responsibly. Using the tools that are ready at hand, we can make better societal decisions and eliminate the misuse of resources and end the mistreatment of people and the environment.

**Amanda Novak and Summer Antrim, Cristina Castillo, M.S. (First Scholars Coordinator)**

## First Scholars Program for First Generation Students

*One Small Step for Research, One Giant Leap for First Generation Students*

The First Scholars program targets first generation students to help teach them the value of education and leadership. It is meant not only to promote success during the academic years, but also long after the students obtain their degrees. It is a financial aid, resource for achievements, and network for future endeavors. In an effort to pay it forward, a senior service project has been created in an attempt to help other first generation students achieve some of their own personal goals. I chose to increase research awareness and use my experiences to influence and guide a fellow First Scholar. She has entered the world of research and reaped some of the benefits early on. The project she is assisting with, under guidance of Dr. Apgar, is as follows:

Dr. Apgar offers a class on swine management and has introduced the concept of copper being known to increase the weight of newly weaned pigs. By recognizing copper's ability to potentially increase the overall carcass weight of pigs' swine management, Undergraduate, Jayden Auvenshine developed a thesis to introduce piglets to a copper infused milk supplement one week after birth for a twenty-eight day period. If the thesis proves true this can positively impact the swine industry's efficiency as well as providing benefits on an economic level. Being introduced to research has provided the opportunity to learn some of the fundamentals of science, such as feeding times and weigh-ins for data collection, but also the opportunity to observe some higher-level skills such as blood chemistry.

As a first generation student, the college experience is unfamiliar. The First Scholars program helps illuminate the unknown and prepares students for real world experiences. Research enhances these experiences while providing a forum to promote personal and professional growth.

**Austin Nunn**

Sustainability Office

*Design in Sustainability*

Through the past semester and this spring, I have done a lot of work for the Sustainability Office. Coming in as an undergraduate assistant in communications for the office is a great opportunity for me. This presentation includes three flyers that greatly show my progress as a designer in the office.

The first flyer was for the Professional Image on a Dime event, where students could pick up free professional clothing donated by the SIU community. The renaming of the event prompted the first change to the flyer, followed by a request to include more information. There was also a lot of information to communicate in the first place, then I was asked to put on even more on the flyer. The different versions show my process of utilizing the space to display all the needed information and a graphic to help.

The Green Fund flyer was an interesting one to work on. This underwent a massive change as I discovered more about university advertising and design. In the older version I took the pictures used in it. Deciding which ones to use and making them fit properly was a struggle with this design. After some collaboration with my team I came to the simpler design with just the solar table; this design is now much cleaner and better portrays the design style of SIU.

My most recent work is a flyer for Freecycle events at the Gaia House. This has two different versions playing with the recycling icon. Text color and placement played a big part in my process as the graphic takes up half of the flyer.

Overall, I look forward to continue growing and learning through my position with the Sustainability Office.

**Olivia O'Donnell, Maria Claudia Franca, Ph.D., CCC-SLP**

Rehabilitation Institute, Communication Disorders and Sciences Program

*The Role of Caregivers in People with Dysphagia and Dementia*

Dysphagia and dementia are commonly comorbid in the aging population (Chadwick & Jolliffe, 2009). Dysphagia is characterized as having difficulty in eating and swallowing (Chadwick & Jolliffe, 2009). Dementia is a continual loss of cognition that interferes with a person's social life and daily activities (Benati, Coppola, & Delvecchio, 2009). It is critical to understand the importance of caregiving in an effort to offset the severe effect of the comorbidity of dysphagia and dementia, because dementia is the fourth leading cause of death amongst the aging (Benati, Coppola, & Delvecchio, 2009). Because both dementia and dysphagia are generally progressive disabilities, caregivers are fundamental advocates of their loved one's needs. A better understanding of caregiver's involvement with the client and the client's treatment wishes can result in an overall more efficient and qualitative form of treatment for both dysphagia and dementia. Therefore, the client will still be able to have a part in the decision making process through the caregiver's assistance, at any stage of disability. This literature review will discuss the comorbidity of dementia and dysphagia, associated risks, and the roles of the caregivers in treatment.

**Samuel B. Oltman, Nicholas C. Hager, Emily R. McKinney and Kathleen Pericak-Spector**

Department of Mathematics

*Results of Supplement Instruction*

Many classes here at SIU do not give students the opportunity to participate in supplemental instruction – something that we believe everyone should have the choice of participating in. Beginning mathematics courses for engineers are taught with this format which includes three extra hours a week of classroom time. The first hour is spent with the instructor teaching the lesson. During the second hour, students work in groups working on worksheets or homework practicing what they have learned the previous hour. Undergraduate Assistants will then stay the entire hour and work with the students, answering questions they may have, guiding them through the work, and encouraging them to work with the others in their group. We propose that this supplemental instruction is beneficial to the students that have it, and would be beneficial for other students that do not. A survey will be distributed to significant engineering classes (specifically in Mechanical, Civil, and Electrical engineering), as well as mathematics classes, some of which offer supplemental instruction and others that do not. By researching a wide variety of classes with the engineering-based mathematics classes at the center, we will be able to determine if the supplemental instruction would benefit other classes. Although supplemental instruction essentially forces the students to spend more time on the subject, it also forces them to keep up with the material and receive help for the questions they may not know they even have. We believe that this extra practice and involvement with the material immediately after being taught the lesson results in a higher understanding of the subject, which results in better grades for the students – an advantage that should be given to all students, if they so choose.



**Shelby Orr, Shannon McDonald**

Architectural Studies

*Sustainable Transportation, A Bicycle Friendly University Abstract*

The objective of this project is to apply for a Bicycle Friendly University Award from the League of American Bicyclists for the Southern Illinois University campus. As the application is completed, the needs of SIU to support bicycling are being assessed and will be addressed. The application evaluates the University's encouragement of bicycling, education about bicycling, the infrastructure of bike paths and racks, the enforcement of bicycle policies, and the overall evaluation of the campus and bicycling. The infrastructure of the campus bike paths and bike racks has been evaluated by bike counts at every rack on campus and a campus wide survey assessing where students and faculty see the need for more infrastructure. In order to evaluate the campus properly and further the promotion of bicycling, the need for a bicycle master plan for the campus is becoming apparent. As a result, the bicycle master plan is in the beginning process of being accomplished through further research and discussion among campus departments. Through the Bicycle Friendly University application, SIU will become more aware of bicycle issues and needs and be better equipped to address these concerns as well as promoting and encouraging bicycling as a sustainable means of transportation for everyone on campus.

**Eric Oseland, Eric Miller, and Karla Gage**

Department of Plant Soil and Agricultural Systems

*Overwinter nitrogen retention of mowed and standing populations of waterhemp (Amaranthus tuberculatus) and marehail (Conyza canadensis)*

Waterhemp (*Amaranthus tuberculatus*) and marehail (*Conyza canadensis*) are pernicious weeds in row crops that are becoming increasingly difficult to control with herbicide applications. If agronomic conditions are not favorable, growers may choose to leave a field fallow as prevent plant acres. Although desirable crops will not be growing in these fields, weed species will still be present in heavy populations. This research examines the nitrogen uptake of a population of waterhemp and a population of marehail. A population of each species was selected from a location at a Southern Illinois University research site in Jackson County, IL, and one strip of each population was mowed in the fall and one was left standing through the winter months. Samples were collected from both standing and mowed areas in the fall and then again after winter, and nitrogen analysis was performed for each sampling period. The results of this research will measure the amount of nitrogen each population returned to the soil through the winter to determine the best management practice for prevent plant acres. Results are currently pending.

**Katy Ovington and Dr. Jared Porter**

Department of Kinesiology

*The Effects of Focus of Attention on Muscular Endurance and Heart Rate During a Fatiguing Task*

The constrained action hypothesis proposes that an external focus of attention improves motor performance compared to an internal focus of attention as a result of changes in movement automaticity. Little research has examined how altering focus of attention impacts muscular endurance. Additionally, little is known about the relationship between the focus of attention effect and heart rate, especially while performing a fatiguing task. This is of particular importance considering there is a strong correlation between heart rate and skeletal muscle activity. The present study examined the influence of focus of attention on heart rate and muscular endurance. Using a within-participant design, participants (N=48) performed a fatiguing wall sit task. Volunteers' were assessed on the wall sit task in three counterbalanced conditions: External, internal, and control. We examined two variables. First, the average heart rate was assessed during the task.

Secondly, the duration until muscular failure was recorded. Our hypothesis was that heart rate would be lower in the external condition compared to the internal and control conditions. In addition, we predicted that the time to muscular fatigue would be greater during the external condition compared to the internal and control conditions. Results indicated that the average heart rate of the external condition was significantly lower than the internal condition. However, the heart rates of the external and control conditions were not different. In regards to muscular fatigue, the time until failure was significantly greater when participants focused their attention externally compared to when they were in the internal or control condition. Also, participants had a higher time until failure when in the control condition compared to the internal condition. The results of this study indicate that directing attention externally rather than internally not only improves muscular fatigue but also results in a lower heart rate when performing a fatiguing task.

**Alan Y. Park and Ben W. Fairbanks Advisor: Sam Chung, Ph.D.**

Information System Technologies (IST), School of Information Systems Applied Technologies (ISAT), College of Applied Sciences and Arts (CASA), Southern Illinois University (SIU), Carbondale, IL 62901 {yeonhoonpark, benwestfairbanks, samchung}@siu.edu

*A Comparison of Web Application Development Environment with Architecture: Traditional and Cloud Approach*

The purpose of this research is to find which approach is better for undergraduate students to learn web application development with Ruby on Rails (RoR) between traditional and cloud approach. Nowadays, Cloud Computing is a rising trend in web application development environment. The cloud service allows instant collaboration, integration with other online services, and avoids installation and configuration on any workstation. However, as undergraduate students learn web application development with RoR, they follow a set of traditional steps from the textbooks, by using the computer's command prompt or terminal which is a traditional way. In this research, for the traditional approach, we choose Ubuntu 14.04 on VM workstation 12 and Visual Paradigm Computer-Aided Software Engineering (CASE) tool as environment. For cloud approach, we applied Cloud Computing to get knowledge and hands-on skill for RoR by using Cloud9 Integrated Development Environment (IDE) and modeling platform GenMyModel as a CASE tool to create Unified Modeling Language (UML) diagram. The cloud approach shows that cloud computing is beneficial for collaboration which is essential of team project in software industry. Since it is hard for a student to get a chance to collaborate others on their web application development projects through the traditional approach, the cloud approach would give a way to students to understand the advantage of collaboration with the software architecture in the work. Learning web application development with RoR on cloud environment demonstrate undergraduate students for their future careers in industry or advanced studies.

**Emily V Peterson and Dr. Yanna Liang, PH.D., P.E.**

Department of Civil and Environmental Engineering

*An integrated platform for producing biofuels from sweet sorghum bagasse*

The burning of fossil fuels for transportation is not sustainable, nor environmentally friendly. For this reason, it is necessary to explore other options such as the production of biofuels. In this research, a method was developed for producing biodiesel from sweet sorghum bagasse. Sweet sorghum is a crop that is as easy to grow as corn, but better able to withstand drought and flooding. Crushing the stalks releases a juice that can be used for ethanol production. In our lab, we use the biomass that remains after crushing the stalks, known as bagasse, to research biofuel production. By pretreating the sorghum bagasse in dilute sulfuric acid at a high temperature, 92.2% of the available sugars are released. A yeast strain called *Cryptococcus curvatus* is grown on the hydrolysates of the bagasse. Then the yeast is subjected to a process called in-situ transesterification which converts any accumulated lipids into crude biofuels. This process is fairly simple and efficient, however yeast cell residue and the washed solids following pretreatment currently remain as waste. For this reason, we are trying to convert the waste to bio-oil through hydrothermal liquefaction. We will test the yield of bio-oil under varying conditions to determine the optimal parameters. Through this research, we hope to find a cost-effective, sustainable way to produce biofuels.

**Richard Peterson, Hassana Samassekou, Dipanjan Mazumdar**

Department of Physics

*High Resolution X-ray investigation of few-layer Molybdenum Disulfide (MoS<sub>2</sub>) Based Heterostructures*

MoS<sub>2</sub> has historically been used as a solid lubricant because of its low coefficient of friction. In thin films of MoS<sub>2</sub>, particularly a monolayer, the band gap nears a direct gap. This property of MoS<sub>2</sub> could play an important role in optoelectronics and magneto-optics applications. Certain device applications of MoS<sub>2</sub> require a heterostructure combination with other compatible materials. Through magnetron sputtering, a type of high vacuum physical vapor deposition, prototypes of few-layer MoS<sub>2</sub> have been deposited on silicon (Si) substrates. Many types of heterostructure combinations such as molybdenum disulfide on boron nitride (MoS<sub>2</sub>/BN), molybdenum disulfide on silicon dioxide (MoS<sub>2</sub>/SiO<sub>2</sub>), and other combinations of these materials will be grown and characterized by their structural properties. These different heterostructures of MoS<sub>2</sub> will be analyzed by X-ray reflectivity (XRR), small angle X-ray scattering (SAXS), and X-ray diffraction (XRD). Our preliminary work already indicates that MoS<sub>2</sub> deposited on BN is quite favorable for optoelectronic applications [1]. But substantial work remains in order to obtain abrupt interfaces and atomic-level control. High resolution X-ray analysis can provide the essential understanding into the various structural aspects (crystal structure, interface roughness, density thickness) which could be valuable for developing a diversity of optoelectronic applications using MoS<sub>2</sub> or other transition metal dichalcogenides.

**Tyler Pokojski and Ahmad Fakhoury**

Department of Plant, Soil, and Agricultural Systems

*Testing Different Biocontrol Agent Modes of Action against F. Virguliforme*

Soybeans have been in large scale production in the U.S since the 1920's. Today soybeans are one of the largest cash crops and one of the most important protein sources across the globe. The world population is growing at an exponential rate, and maximizing soybean production is more crucial than ever. But, many different diseases, particularly in the most recent growing seasons, have had a detrimental effect on soybean yield, causing some farmers to have a complete loss. Major funding and testing is currently being conducted within academia and industry to find new methods to combat these diseases.

The objective of this study is to find particular combinations of BCA's with different modes of action to control the soybean pathogen *Fusarium Virguliforme* which is the causal agent of Sudden Death Syndrome (SDS). This study will be conducted in two parts. The first part was conducted *in vitro* with a side-by-side comparison of each of the BCA's that can make up possible combinations, observing if there are any synergistic or antagonistic results in each combination, and choosing which combination seems to have the most success. The second part of this experiment will to observe how the two BCA's interact with each other and the level of control of the pathogen. This was done *in vivo* by inoculating soybean seeds and soil with the BCA's and pathogen respectively.

**Avery Purdom & Evan Coulson Mentor: Dr. Jun Kim**

Department of Health Education and Recreation

*Common Behavior Discipline Methods Across Three Settings*

The literature reveals several different types of discipline methods for behavior management. Some of the different types of discipline found in all three were time out, take electronics away, and a reward system. The purpose of this study was to determine the most commonly used discipline methods for behavior management across three different settings: homes, schools, and mental health facilities.

An online survey instrument was utilized (n=69) to access a broad sample resulting in a gender breakdown of 66 female and 3 male respondents. My survey included a total of 10 questions. The first 5 questions were demographic questions, and the other 5 questions related to the different discipline methods for each section. Since the present author did the survey online, I got all of my results there. I had graphs made from the results.

Results indicated that the most common discipline method for behavior management in the home setting is taking away electronics. For the classroom setting, results indicated that explaining, behavior modeling, money systems, and a daily calendar were popular discipline methods or behavior management techniques. Mental health facilities utilized positive behavior modification, leverage, cause and effect, verbal redirection, point sheets, privilege removal, and education about good choices. Findings suggest two discipline methods/behavior modification strategies common between all three setting groups: taking things away and talking to the child.



**Kimberly Race and Seung-Hee Lee, Ph.D.**

School of Architecture, Fashion Design and Merchandising

*Brand Sensitivity, Self-Expressive Brand, and Brand Loyalty among Adolescents*

Human beings tend to be committed to what they feel connected with, and the target can be other people or intangible entities like brands. Brand sensitivity and self-expressive brand is being very certain to what kind of brands to buy. Brand loyalty is when a consumer becomes dedicated to a certain brand and makes reoccurring purchases over time. Thus, it would be very significant to research fashion brand sensitivity with regards to brand loyalty amongst adolescents. The purpose of this study is to better understand and examine adolescents brand sensitivity, self-expressive brand, and brand loyalty in fashion items. For the data collection, 70 adolescents were asked to participate in the research, questioning them on a 5-1 scale (5 being strongly agree 1 being strongly disagree) on how brand sensitive, self-expressive to brand and brand loyal they were. For data analysis descriptive data, Cronbach's alpha reliability, correlations, and regression were conducted. As a result, there were significant connections between brand loyalty, self-expressive brand (inner/social) and brand sensitivity among adolescents. Participants who were very brand sensitive and self-expressed to the brand also, had a great amount of brand loyalty. However, there was no gender difference between boys and girls in brand loyalty, brand sensitivity, and self-expressive brand. These results would provide fashion corporates or retailers to better understand their customers, especially about the relationship between a consumer and a brand. Thus, this research will be very useful for providing more efficient fashion brand marketing strategies to fashion brand managers or corporations.

**Amelia Raymond, Amanda Weidhuner, Sarah Bowman, and Dr. Taylor**

Department of Plant, Soil, and Agriculture Systems

*Vineyard Response to Reduced Mowing Frequency*

Currently vineyard floor management decisions are not made on biological, soil or vine based needs. Therefore a research project was established to investigate three different mowing frequencies. The goal of the research is to measure the responses of a mature vineyard's soil structure, mineral content, and vine growth. Three mowing treatments were applied, grower control (mowed at two and a half week intervals), one year (not mow for one year), and 7 year (not mow for seven years). Treatments were arranged in randomized complete block design. These treatments were applied to vineyard aisles of own rooted hybrid winegrapes, trained to a high bilateral cordon system. In the fall of 2015 data were collected on soil compaction, plant parasitic nematode populations, and soil nutrient. Vine growth and vineyard floor aisle biomass will be collected when is seasonally appropriate for analysis. The treatment not mowed for 7 years produced soil that was 33% and 50% less compacted than the control at the 10-20 cm and 0-8 cm depths, respectively, based on penetrometer sampling. The 7 year treatment also increased P, K, and Mg soil mineral availability to the grapevine. Reduced mowing frequencies have the potential not only decreases fuel and labor costs, and compaction and erosion of topsoil, but also increase longevity, yield, and fruit quality of a vineyard.

**Kelsey Reed, and Dr. Geisler-Lee**

Department of Plant Biology

*Intraspecific Competition of Arabidopsis thaliana*

For centuries plant physiology has been tested and studied to the most complex of ideas, but the simplest of ideas could even be complex to research. Root interactions seems like a fairly basic idea but when it comes down to the actual mechanisms behind what makes roots grow and in what direction they grow in, what is it that the roots are really responding to? This research looks at both nutrient deficiency and high root hormone levels to see which one, if either, affects the surrounding plant and root growth of *Arabidopsis thaliana*. The root and shoot systems are photographed for 28 days after planting (DAP). To observe roots, a gel media was used while soil was used to grow the *A. thaliana* and record the rosette diameter plant above ground. The nutrient data shows that there were more nutrients in the fresh soil than any of the soil after 28 DAP. There was no significant difference in ammonium or nitrate between the different trials. As for the rosette diameter, the high and the control had the most statistical significance to each other than any of the other treatments had. Data for the root growth and directionality is still being analyzed. The results that we have so far suggest that the roots of the plant respond first to the intraspecific competition, then the leaves respond next.

**Sydne Rensing and Beth Alongi**

Student Center Marketing and Graphics Undergraduate Marketing Assistant

*Student Center Snapchat*

My research will be focusing on how I brought Snapchat to the Student Center and how the marketing team and myself are using it efficiently. I will be comparing the pros and cons of the application and will ultimately gain a better understanding of the application all together while seeing if it has actually increased traffic in the Student Center. I will be discussing the appeal of Snapchat and why I opted to bring this mobile application into our marketing plan, the process of bringing it into the Student Center and how I was able to get students to become aware of our account, the views, the interaction, the results, and what this could bring to the marketing scheme of the Student Center in the future. With Snapchat being one of the most popular mobile applications right now, students really appreciate seeing their university keeping with the current trends and makes them be more excited about getting involved.

**Ethan Richardson Mentor: Eric S. Jones**

University Museum

*Researching an Artifact from the University Museum's Collection*

The purpose of this project was to research an artifact in the University Museum's collection and discover its origins. Specifically, the research was centered around a painting of the famous author Mark Twain which was recovered from an old hotel in Saint Louis. Other objectives included establishing a link to Southern Illinois and discovering Mark Twain's relevance to the area.

Throughout my research, I was introduced to several creative new methodologies of research. I particularly enjoyed reverse image searching, utilizing historic Sanborn maps, and studying census records both online and in print. My research lead me to discover another, much newer painting of Twain in the same pose. Through contacting the artist, I determined that both of these paintings originated from the same historic photograph.

My research motivated me to take a trip to Saint Louis where Twain had a great following. By utilizing what I gathered previously from historic maps and records, I went to explore the original site where the old hotel had stood and the artifact was thought to originate. The hotel had since been demolished and the Wainwright expansion stood in its place. I then explored the second Mark Twain Hotel which was still standing a block away. This activity allowed me to gain perspective on the architectural style of the time, as they were both built similarly. I was also able to see the nearby Eugene Field House Museum, which Mark Twain dedicated.

While researching Twain's steamboat travels, I found that he may have drawn inspiration for his Thomas Sawyer character while staying at a hotel in Shawneetown, Illinois. Continuing with this, I explored genealogy for the first time, constructing family group records and rough family trees for notable people who may have had a connection to Twain.

**Tia Richardson, Sunni Primeaux M.S., Kail Seymour M.S., & Chad E. Drake PhD**

Department of Psychology

*Measuring Explicit and Implicit Biases of Schizophrenia: A Predictive Validity Study*

The purpose of this study was to assess the predictive validity of the Implicit Relational Assessment Procedure (IRAP; Vahey; et al., 2009) by determining the subtle differences between implicit and explicit bias. Self-report measures and the IRAP were used to investigate explicit and implicit biases towards schizophrenia. There were 12 self-report measures, which included, the use of vignettes designed by the researchers to evaluate the explicit attitudes individuals have regarding schizophrenia (undiagnosed and diagnosed). The IRAP was used as a predictor of an individual's response to two gender matched Social Distance Scales (Pratto, 1994) which measured a participant's willingness to interact with a non- diagnosed individual and a diagnosed individual. The participants were volunteers from a 100 level psychology class and were asked to answer the self-report measures (not including the SDS) first.

Students learned the rules of the IRAP and were trained to follow those rules. Following the IRAP, the students gave their responses to the Social Distance Scales. It was proposed that individuals would present with IRAP scores that are consistent with a pro-non-diagnosed bias. It was also hypothesized that those same scores would predict the SDS scores.

**Mallory Roberts, and Dr. Lydia Arbogast**

Department of Physiology

*Characterization of Antibodies Used to Identify Androgen Receptor and Tyrosine Hydroxylase Expression in Hypothalamic Dopamine Neurons*

Androgens have roles in normal physiology and pathophysiology in women. Circulating androgen levels are high in diseases such as polycystic ovary syndrome and some of the most widely used progestin oral contraceptives have androgenic actions. Our lab previously identified an androgen receptor and progesterone receptor interaction on tyrosine hydroxylase promoter activity in an in vitro experiment using cell lines. In order for this molecular mechanism to be relevant in vivo, androgen and progesterone receptors must be colocalized in the nucleus of the same cells. The purpose of this study was to characterize antibodies to identify androgen receptor, progesterone receptor and tyrosine hydroxylase expression in the hypothalamus. Adult female rats were ovariectomized, followed by injections of estradiol (20 µg/rat) at 48 and 24 hours before the end of the experiment. Rats were perfused with 4% paraformaldehyde. The brain was collected and cryoprotected with 30% sucrose. Using immunohistochemistry, brain sections containing the hypothalamus were double labeled using either an androgen receptor or progesterone receptor antibody with a tyrosine hydroxylase antibody. The primary antibodies were a rabbit anti-AR (1:200) with a mouse anti-TH (1:500), or a mouse anti-PR (1:200) with a rabbit anti-TH (1:500). The second antibodies diluted 1:500 were Cy3 goat anti-rabbit IgG with an Alexa-Fluor 488 goat anti-mouse, or a Cy3 goat anti-mouse IgG with an Alexa-Fluor 488 goat anti-rabbit. DNA was stained using Hoechst 33258 dye. Immunostaining was visualized using a confocal microscope with 488 nm (Alexa-Fluor 488), 561 nm (Cy3), and a 405 nm (Hoechst 33258) lasers. Results showed a subpopulation of dopamine neurons in the hypothalamus with tyrosine hydroxylase cytoplasmic immunostaining, which were also immunopositive for nuclear androgen receptor. An antibody has been identified to suitably identify androgen receptor expression in dopamine neurons, and we are currently looking for a mouse monoclonal antibody to identify progesterone receptor expression.

**Kelby Rogers, Mentor: Dr. Tsuchin Philip Chu**

Department of Mechanical Engineering and Energy Processes

*Optimal Speckle Pattern for Adhesive Joints Using Ultrasonic Digital Image Correlation*

Composite material and adhesive joints are being more widely used in commercial industries such as automotive, naval, and aviation [1]. An innovative nondestructive evaluation method (NDE) must be researched in order to analyze the adhesively bonded joint. Most methods analyze the exposed surface, but an embedded speckle pattern inside the bondline can be used to assess the adhesive more closely, internally assessing the strength more accurately. Digital image correlation (DIC) uses the speckle pattern to create a strain map of the adhesive joint.

The purpose of this research is to find the best element for the embedded material, as well as, finding the optimal density of the speckle pattern. Samples will be prepared using Iron, Nickel, or Copper beads with a pattern density of low, medium, or high. This creates nine different types of samples to test. During this trial, after taking the reference image using Ultrasonic C-scan, three translations will be applied using precise instrument and scanned at each position. A DIC program called Ncorr will be used to evaluate the specimen's images. With the known translation, each type of sample will be evaluated for accuracy. To confirm all findings, there will be a final test using optical DIC. Since, optical DIC is more widely used the accuracy has been confirmed through several trials. As a novel NDE method, this experiment will help further the information for Ultrasonic DIC and the embedded DIC method.



**Shawn T. Roller, Ryan C. Holden, Daniel R. Grisham, and Michael J. Hylin**

Neurotrauma and Rehabilitation Laboratory Department of Psychology

*Use of the probiotic strain *Lactobacillus Reuteri* on treating cognitive deficits following brain injury early in life*

Traumatic brain injury remains a serious health problem in the United States of America. According to the Centers for Disease Control and Prevention, traumatic brain injury affects 2.5 million Americans each year and is the leading cause of death and disability in children and adolescents. Modifying the gut microbiota through the use of dietary probiotics is becoming an accepted therapeutic for diseases such as irritable bowel syndrome and have the capacity to impact brain function. It is hypothesized that the overall health enhancing effects of treatment lead to anti-inflammatory and tissue regenerative capabilities. Recently a strain of *Lactobacillus* has been found to regulate emotional behavior and central GABA receptor expression in adult mice via the vagus nerve. The current study sought to determine if there are similar effects using this treatment following a traumatic brain injury (TBI) in immature rats.

Male rats received a controlled cortical impact injury to the parietal lobe on postnatal day 28. Subjects were fed the probiotic from postnatal day 29 through postnatal day 57. Behavioral testing was done following surgeries, with injured and non-injured rats, using the Morris water maze to test spatial memory and to evaluate cognitive differences between groups. Positive results would suggest an easily affordable and readily available treatment is available for individuals inflicted with a TBI.

**Jocelyn Rothschild-Frey, Cody Yarnell, Juliane Wallace**

FACSM Kinesiology, Southern Illinois University, Carbondale, Illinois

### **CALF VENOUS COMPLIANCE DIFFERENCE IN MALE AND FEMALES**

Similar to changes in arterial compliance with fitness and aging, venous compliance in the lower extremities of adults improves with higher fitness and declines with increasing age. In young adults, males have a higher venous compliance than females, a difference that does not appear related to hormonal fluctuations. Most of the previous studies have used small groups to make these comparisons. **PURPOSE:** To determine the calf venous compliance differences in males and females in a larger group of adults. **METHODS:** 71 females and 102 males volunteered for this project. Participants underwent anthropometric assessment, a submaximal graded exercise test, and assessment of calf venous compliance. Utilizing venous occlusion plethysmography, calf pressure-volume relations were determined using the quadratic regression equation  $[(\Delta\text{limb volume}) = \beta_0 + \beta_1 * (\text{cuff pressure}) + \beta_2 * (\text{cuff pressure})^2]$ . Calf venous compliance was calculated as the first derivative of the pressure-volume relation during cuff pressure reduction. Capacitance and capillary filtration volumes were determined from the increase in limb volume following cuff pressure inflation. Sex differences in anthropometric variables, fitness, and compliance ( $\beta_1$ ,  $\beta_2$ , and the slope of the pressure compliance relationship) were analyzed with a simple ANOVA. **RESULTS:** The males and females were of similar age [102 males (26±12 yrs), 71 females (28.±17 yrs)] and fitness level (males 50.24±19.55 ml\*kg<sup>-1</sup>\*min<sup>-1</sup> vs. females 47.84±16.03 ml\*kg<sup>-1</sup>\*min<sup>-1</sup>). The males were larger in size (BMI: 25.07±3.81 kg/m<sup>2</sup>; calf volume: 585.79±116.70 cm) than the females (BMI: 23.78±4.3 kg/m<sup>2</sup>; calf volume: 497.52±132.31cm). There were no differences in calf venous compliance [males;  $\Delta\text{Limb Volume} = 0.6665 \pm 1.89051 + 0.0939 \pm 0.1119 (\text{Cuff Pressure}) - 0.0212 \pm 0.20587 (\text{Cuff Pressure})^2$  vs. females;  $\Delta\text{Limb Volume} = 1.8384 \pm 5.28027 + 0.1083 \pm 0.12568 (\text{Cuff Pressure}) - 0.0009 \pm 0.00107$ ] between males and females in this large group. The capacitance response was similar between males and females, but the capillary filtration response was greater in the females (1.4112±2.446 ml vs. 0.7942±0.952 ml). **CONCLUSION:** Differences in calf venous compliance were not significant between the males and females in this large data set. However, consistent with previous research, capillary filtration was higher in females than males.

**Devon Ruhde and Sarah Kertz, Ph.D.**

Department of Psychology

*Anxiety Break: A Smartphone Application Used to Examine the Mediating Effects of Metacognition on Generalized Anxiety Disorder*

Worry is the highlight characteristic of generalized anxiety disorder (GAD). While worry is very common in anxiety disorders, it is important to note that worry is common in non-clinical populations as well. The current study focused on the metacognitive model of GAD (Wells, 2005). Various intervention types available for those with GAD have been examined. However, with the surge of technological advances being integrated into the field of psychology, it is important to examine technology-based treatments, more specifically smartphone application interventions. The purpose of the current study was to use a smartphone application (Anxiety Breaks; Habib, 2013) that targets worry in a population that met GAD criteria using the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990). The goal was to examine how metacognitions mediate GAD symptoms before and after a three-week trial of application usage. It was hypothesized that post-usage scores would reflect a reduction in anxiety symptoms.

Twenty-six undergraduate students at a large Midwestern university whom have reached the proper criteria for GAD after a phone screening of the PSWQ were recruited. Students engaged in an hour-long time one survey and computer task after which they were given the smartphone application to use for three weeks if they were in the immediate group or were told to wait for three weeks if they were in the waitlist group. Both groups came in for another hour session after three weeks for time two and were given the opposite instructions from time one. At the end of three weeks, they were sent an online survey for time three. GADQ-IV and MCQ scores were predicted to decrease at time two after application use.

**Michael Sall and Ahmad M. Fakhoury**

Department of Plant, Soil and Agricultural System, Horticulture

*In vitro* screening of native *Trichoderma* spp. isolates as potential biological control agents of seedling diseases of soybean caused by *Macrophomina phaseolina* and *Rhizoctonia solani*

Soybean (*Glycine max* (L.) is an important agricultural crop that is affected by economically important diseases such as root rots and damping offs caused by the soil-borne pathogenic fungi *Macrophomina phaseolina* and *Rhizoctonia solani*. Both species grow and mature as mycelia without producing spores. They reproduce through the creation of micro-sclerotia. A micro-sclerotium is a compact mass of hardened fungal mycelium. The hardened nature of the sclerotia makes control methods extremely difficult. More recently, biological control has been used as an alternative to control these pathogens. Beneficial fungi were shown to inhibit the mycelial growth, which results in a reduction in the formation of problematic sclerotia. This experiment was a continuation of a previous experiment that was conducted initially to screen native potential biocontrol agents (BCA) for the control of pathogens that cause seedling diseases in soybean. This research study helped identify the best isolate(s) of *Trichoderma* spp. as potential BCA to *M. phaseolina* and *R. solani*. The implications of this project were important for significantly reducing the use of harmful chemicals to control these pathogens.

**Francesca Sanchez and Vjollca Konjufca**

Department of Microbiology

*Eliciting an immune response: antigen transport through the avian Bursa of Fabricius*

Avian lymphoid organs can be split into two broad categories: central and peripheral. One particular central lymphoid organ, the Bursa of Fabricius (BF), plays a critical role in the development of B-lymphocytes, generation of a diverse antibody repertoire, and is a gut associated lymphoid tissue (GALT) contributing to adaptive immune responses. This organ is located on the dorsal region of the chicken, near the anal passage. Researchers have repeatedly demonstrated the decreased ability of bursectomized chickens to produce B-cells, yet very little research has been done on how the BF physically interacts with antigens. Immunizing per orally (PO) or per ventrally (PV) induces an immune response, therefore a group of female Black Australorp, at one week, were administered 40nm fluorescent nanoparticles (NPs) either PO or PV and the BFs were collected after 1 hour or 6 hours. Tissues were analyzed using immunofluorescent microscopy (IFM), and show that the NPs were actively taken up by the BF and accumulated in follicles that reside in the BF. The NPs were most likely taken up by the follicle-associated epithelium (FAE), which has pinocytotic activity. The specific mechanisms of antigen transport and distribution are still unclear, yet these studies are a step forward in finding the mechanisms involved with the chicken's immune response, and can lead to how the BF elicits

**Peter Schorsch, Lee Cooper, Cody Lingle, Ren Jing, & Ziyad Alotaibi; Andrey Soares, Ph.D.**

School of Information Systems and Applied Technologies

*Web Application for the Midwest Water Polo Society (MWWPS)*

We have created a fully functional web application using the MVC framework to support the activities of the future Midwest Water Polo Society (MWWPS). The MWWPS is being formed to assist the development of the sport in the Midwest. The SIU Water Polo Club is one of the teams involved in this new conference. The application will provide a way for teams to communicate, facilitate scheduling tournaments and make traveling easier.

This system has three types of users: administrator, officer and guest. The administrator has the ability to add and remove teams from the web application. In addition, the administrator can accept/reject requests made from officers who would like to modify text in the web application. An officer can make change requests if they find out that information is incorrect and needs to be fixed. Both administrators and officers can update the availability of their team to assist them in scheduling tournaments and games.

They can also view which teams are available each weekend in a calendar. Everyone (administrators, officers and guests) will be able to view the schedule from the current year as well as past seasons. Also, everyone will be able to access the travel section of the web application where the addresses of each team are located. Links are provided for each team where you are taken to Google Maps giving directions to the school.

Throughout the process of creating the web application, we used the Scrum methodology. To help create the web application, we used SQL, PHP, HTML, and Bootstrap. As far as tools we used Eclipse, Aptana Studio 3, phpMyAdmin, MySQL Workbench and Trello.

**Eric Secrist<sup>1</sup>, Matt Maloney<sup>1</sup>, and David Bell<sup>2</sup>**  
**Mentor: Shannon Sanders McDonald<sup>1</sup>**

<sup>1</sup>Department of Architecture

<sup>2</sup>Department of History

*Southern Illinois University: Building a Campus History*

This project involves the documentation of the architectural and campus design of Southern Illinois University in Carbondale, Illinois. Various campus resources have been consulted such as presidential files and photographs from Special Collections Resource Center, constructed maps and proposed construction maps from the Geospatial Resource Center, construction documents and records from the Physical Plant, personal photographs from Campus Photographers, and informational plaques found in the buildings themselves to construct a visual history of the campus.

Each building has a story to tell and is a snapshot of the SIU campus at the time that it was constructed. Although the campus was chartered in 1869 the first permanent building for Southern Illinois Normal University, later renamed Southern Illinois University; Normal Hall was designed in the gothic revival style. The four floor all-purpose building was completed on May 17th, 1870 with a celebration that included an estimate of twenty thousand people. A fire occurred in the first building on campus, on November 26th, 1883 that was severe enough to condemn the building and leave the campus without a building. Normal Hall was the dorm, classroom, dining hall, as well as anything that was needed by the early campus. Another notable campus building, Shryock Auditorium is named after former SIU President Henry Shryock and was designed in the Roman Revival Style by J.B. Dibelka and construction was completed in 1917.

This project highlights the visual messages imbedded in architecture to understand the growth of the campus and has also explored the multiple campus plans created throughout over time that have guided the development of the campus. The University has undergone different periods of expansion: A Strong Foundation: (1869-1930), Slow and Steady: (1931-1950), Age of Expansion:(1951-1960), A New Hope: (1961-1980), Sports and Service: (1981-present), and Lost in Time: (Demolished/Inactive).

**Hailey Sellek and Dr. Lydia Arbogast**

Department of Physiology

*Kisspeptin, Neurokinin B, and Dynorphin mRNA Expression in Lactating Rats*

In the brain, the neuropeptides, kisspeptin, dynorphin, and neurokinin B, are colocalized in neurons in the arcuate nucleus of the hypothalamus. The mRNA expression levels for these peptides are impacted by ovarian hormones and/or influence secretion of pituitary hormones involved in fertility. Lactation is a state of reduced fertility in many mammalian species. In order to better understand the physiology of this reduced fertility, it is important to understand the changes in gene expression in these specific neuronal systems. The aim of this study was to evaluate mRNA expression levels of kisspeptin and neurokinin B in the arcuate nucleus of female rats during lactation. In the first experiment, lactating dams remained with their pups or were separated from their pups for 24 hours. Ovariectomized virgin female rats were used as a non-lactating control. In the second experiment lactating rats were ovariectomized one day after parturition. Lactating dams remained with their pups or were separated from their pups for 24 hours or 6 days. Tissue taken from the arcuate nucleus region was examined for mRNA expression levels through qRT-PCR. In the first experiment the mRNA expression levels of kisspeptin and neurokinin B in lactating dams were 10% and 30%, respectively, of the levels of non-lactating controls. There was no significant change in either kisspeptin or neurokinin B mRNA levels with 24 hours separation. In the second experiment kisspeptin and neurokinin B mRNA levels were unchanged at 24 hours of pup separation but increased 3.8 and 1.7 fold, respectively, above suckled levels after 6 days separation. The suppression of neurokinin B and kisspeptin gene expression may contribute to reduced fertility during lactation. Since mRNA levels of kisspeptin and neurokinin B were not increased after 24 hours pup separation, these data suggest a slow recovery from the effects of lactation.



**Sierra Semel<sup>1</sup> and Michael W. Eichholz<sup>2</sup>**<sup>1</sup>Department of Zoology<sup>2</sup>Cooperative Wildlife Research Laboratory, Center for Ecology, Department of Zoology*The influence of social behavior on animal longevity*

Senescence occurs eventually in every organism, but the overall timing can be extreme. The evolutionary theory of senescence model predicts that morphological and behavioral attributes that reduce mortality or increase productivity should select for mechanisms that will delay physical deterioration; resulting in longer life spans and extended breeding opportunities. This suggests that longer-lived animals have more opportunities to reproduce than shorter-lived ones, so natural selection should therefore consistently favor greater longevities. We hypothesize that social behavior can provide an evolutionary adaptation promoting longevity by decreasing extrinsic mortality and increasing productivity of kin, thus inclusive fitness. We predict that species with the highest levels of sociality will exhibit greater longevity than those species that tend to be solitary or have only limited sociality.

Additionally, we expect a positive correlation between both median and maximum life span of species and degree of sociality, increasing from independent during both the breeding and non-breeding period, independent during breeding but social during nonbreeding, social during breeding but independent during nonbreeding, social during both breeding and nonbreeding, and cooperative breeding, respectively. To test our predictions we undertook a literature review and data survey of birds, mammals, and herpifauna to establish a matrix of longevity comparisons among species. Using captive species to minimize extrinsic mortality and pairing species to eliminate confounding factors such as body size, we evaluated a wide range of social and non-social species across a wide range of taxa. Statistical comparisons holding several variables constant allowed us to test age against different levels of sociality.

**Haleigh Sever and Michael Lydy**

Department of Zoology

*Examination of Genetic Distinction and Potential Species Divergence between Resistant and Non-Resistant *Hyalella azteca**

The widespread use of pyrethroids has resulted in unforeseen consequences to wildlife and the environment. The indicator species *Hyalella azteca* is often used to monitor the presence of pesticides, such as pyrethroids in aquatic systems. This cryptic species complex is especially useful in conducting bioassays, because they are relatively easy to culture, and have a wide tolerance range for environmental conditions. *Hyalella* have been found in areas with known pyrethroid concentrations high enough to be fatal to the organisms in a laboratory setting. This indicates that some populations have developed a resistance to this class of pesticide. Southern Illinois University currently maintains two genetically distinct populations of *Hyalella*, belonging to separate clades: one non-resistant strain with no known mechanisms for pyrethroid resistance, and a field-collected strain that has a genetic mutation that alters the target site of pyrethroids on the voltage-gated sodium channel. This mutation reduces the pyrethroid binding affinity, resulting in increased tolerance. The ecological significance and implications of this distinction should be examined. Generally, species are defined as populations of individuals that can exchange genes and interbreed. The two strains will be mixed to allow interbreeding to determine whether they are capable of producing offspring. If they are successful, the two strains may be classified as the same species, and this may call into question the relevance of genetic sequencing. If they are reproductively isolated, the two populations may be distinct species, and we may have to reconsider the effectiveness of using different strains of *Hyalella* as a standard organism for bioassays. To further explore this project, the hybrid offspring will undergo permethrin exposure to determine the inheritability of pyrethroid resistant traits. Additional tests on subsequent generations of the hybrid population will be conducted to test overall viability.

**Austin Sherman\*, Kaylee Agney, and Karla Gage**

Department of Plant, Soil and Agricultural System

*Evaluation of annual rye varieties, planting time and seedbed for cover crop establishment in southern Illinois.*

Cover crops, as defined by the Natural Resources Conservation Service's Conservation Practice Standard, are: crops including grasses, legumes, forbs, or other herbaceous plants established for seasonal cover and conservation purposes. Farmers plant cover crops for the benefits they provide, such as: a nutrient source for the next season of cash crop, preventing soil erosion, adding organic matter to the soil, and possibly other ecosystem services. Annual rye (*Lolium multiflorum gaudini*) is potentially a good fit in southern Illinois, though there are questions regarding both planting and termination.

The objectives of this research are to evaluate four commercially available varieties and three planting dates, seeded into either corn or soybean for effectiveness as a cover crop. The current recommendation for planting time, September 10 to October 1, and seeding into corn are thought to be more successful than seeding into soybean. For this trial, annual rye was seeded on three dates each two weeks apart. The first and second seeding was made into standing corn, or standing soybeans (pre-harvest), while the third seeding was made post-harvest into heavy residue cover. The hypothesis is that earlier seeding and seeding into a standing crop will allow for better establishment and larger plants prior to cold weather. Evaluations included stand counts in the fall as a measure of germination and again in the spring as a measure of winter survival. Additional evaluations of an effective cover crop will include size of plants, tillering, and the cover crop's ability to compete with and suppress weeds. Initial results from the fall evaluations indicate one variety is superior to the others and that even the late planting date was able to germinate and establish prior to cold weather. Results from the spring evaluation are pending.

**Magan Snowden and Cynthia Sims**

Department of Psychology

*On the Quest to Become a Female MD: Perspectives from African American Female Students*

There have been several research studies that focused on the many barriers that African American women face when they are seeking a career in medicine. However, little attention has been given to ways to improve the experiences that these women are facing while progressing through their education. In this study, 8 African American students ranging from 20-25 years of age were interviewed. They were asked questions about mentor-to-mentee relationships and their overall academic experiences as they pursued careers in the medical field. The four key themes that affected their experiences in their pursuit of this career path were poor academic advisement, insufficient support, lack of exposure, and low societal expectations for women. This study revealed that in order to combat some of these common barriers, more faculty that have experienced similar barriers needed to be available so that they could better prepare and mentor students aspiring to be in the medical field more effectively.

**Joshua Sonnenberg<sup>1</sup> and Jerzy Kocik, Ph.D.<sup>2</sup>**

<sup>1</sup>Department of Computer Science

<sup>2</sup>Department of Mathematics

*CONTRIBUTIONS IN CALCULUS TO THE OPEN SOURCE PROJECT CINDYJS, A TOOL FOR PORTING CINDERELLA GEOMETRY SIMULATIONS TO THE WEB*

Cinderella is a popular software tool used to draft interactive geometry simulations. With this software one can draft powerful visualizations of mathematical problems and ideas. These can range from simple graphs to planetary orbits and atom physics. This tool allows one to export their projects into usable applications using packaged JAR files, or Java virtual machine executables. Originally, these JAR's could be deployed on the desktop or on the internet as "applets". However, in recent times, Java web applets have become obsolete and unsupported, dooming Cinderella applications from running on the web.

Recently, however, an open source project was founded to remedy this. CindyJS is a software stack started in 2014 that exports Cinderella projects into pure Javascript and HTML, allowing it be run on any web browser. This project is about halfway along, allowing for most basic applications to be ported.

There is a lot of work to be done, however, with whole sections such as Calculus and Physics simulations not yet being functional whatever. For my project I will be working on starting the Calculus implementation. Applications ported through CindyJS will be allowed to use built in derivative functions, tangent functions, and several more advanced calculations involving Calculus. This will involve writing Javascript code that converts Cinderella code (known as "cindycript") into equivalent Javascript code and HTML markup using a lexer, researching and implementing algorithms to solve Calculus problems, and using GitHub to contribute my own code to the project.

**Kara Starkweather, Dale B. Hales, Ph.D.**

Department of Physiology, Southern Illinois University School of Medicine

*Transfection of Human Ovarian Cancer Cells with NF- $\kappa$ B Reporter to Assess Actions of Inflammatory and Anti-inflammatory Agents*

Nuclear Factor Kappa light chain enhancer of activated B cells (NF- $\kappa$ B) promotes cell proliferation and controls apoptosis. Different types of cancers, including ovarian cancer, are found to have a misregulated NF- $\kappa$ B pathway. Cyclooxygenase-2 (COX-2) is regulated by NF- $\kappa$ B. COX-2 is an enzyme that catalyzes the conversion of arachidonic acid to prostaglandins, such as prostaglandin E2 (PGE2). PGE2 helps regulate and promote inflammation. A high level of inflammation is associated with increased cancer rates and severity of the cancer. Docosahexaenoic acid (DHA) is a long-chain omega-3 fatty acid that is thought to repress the activation of COX-2 through inhibition of NF- $\kappa$ B and, in turn, suppresses inflammation. Eicosapentaenoic acid (EPA) is the precursor to DHA.

The objective of this study is to determine if ovarian cancer cells, in tissue culture, treated with EPA or DHA inhibits COX-2 by blocking the activation of NF- $\kappa$ B in the cells. For this study, the NF- $\kappa$ B reporter plasmid is transfected into ovarian cancer cells using lipofectamine based transfection protocol. Transfection efficiency has been optimized by using GFP plasmid in HEK-293 cells. The reporter plasmid produces luciferase that is secreted out of the cell which allows for the analysis of the media in the form of a luciferase assay. Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), tumor necrosis factor alpha (TNF- $\alpha$ ), Lipopolysaccharides (LPS) and cytokines are pro-inflammatory treatments that activate NF- $\kappa$ B. These treatments will be optimized to obtain the maximum luciferase activity. NF- $\kappa$ B regulates the COX-2 gene and the COX-2 gene produces PGE2, which causes inflammation. An ELISA kit from Cayman Chemicals is used to determine if PGE2 is increased in the different treatment groups. After the treatment period and dosage is optimized using the pro-inflammatory treatments, the ovarian cancer cells will be treated with DHA and EPA in an attempt to inhibit NF- $\kappa$ B and block COX-2 and the synthesis of PEG2.

**Taylor Stieve & Dr. Seung-Hee Lee**

School of Architecture, Fashion Design and Merchandising

*The impact of the First Lady's image making: Who & Why*

The impact of the First Lady of the United States has been monumental over the years. From Martha Washington to Michelle Obama, each has made an impact in their own unique way. A First Lady's image is absorbed, dissected, and judged the second she comes into view. Because of the many angles from which one can assess the First Lady (i.e. an endless array of media), it is hard to determine one definite answer to the interpretation of the First Lady's image making. However, it is possible to see how her image-making affects society as a whole through research of various social mediums, academic sources, and forms of mass media. Hence, the purpose of the study is to collect information that can be used to inform the public and fuel future research opportunities.

This study will focus specifically on Jackie Kennedy, Nancy Reagan, and Michelle Obama as three of the United States' most influential First Ladies. Some questions we will address are as follows: Why is the First Lady's image making so important? Who were the most successful image-makers? Why were they successful image makers? For this study, as qualitative research method, an in-depth examination into a myriad of sources provides an accurate, thorough, and detailed account of answers to each of the questions posed. These results will provide the public with information about the significance of the First Lady's image, and the ways it impacts the way these women are perceived, the weight of their influence on the fashion industry, and their reputation as political and social innovators.

**Briana Kay Stodden and Dr. Angela Aguayo**

Department of Cinema and Photography

*The Evolution of Youth Sports Burn Out*

This documentary short addresses the troubling trend of burn out in young athletes. Recent studies have shown that 35% of children do not want to continue with sports after their first year. And sadly, 7 out of 10 kids will quit playing by the age of 13 because it is no longer fun or they feel too much pressure to win. These studies revealed over 70% of kids would not care if scores were kept and nearly 40% wished that no parents would watch them play. By examining the evolution of the youth sports culture from its beginning in 1903 we can see how parents have in many ways improved the children's games. However, when a parent's involvement unknowingly becomes negative the impact can cause great damage. By understanding the driving force behind these parent's actions and making changes as a community, we can hopefully improve the youth sports playing environment for future generations, before it's too late.

For viewing visit: [www.brianakay.com/YouthSportsBurnOut](http://www.brianakay.com/YouthSportsBurnOut)

Total running time: 13 minutes



**Gavin C Stonehouse<sup>1</sup> & Kurt Neubig<sup>1</sup>**

<sup>1</sup>Department of Plant Biology, Southern Illinois University of Carbondale, Carbondale, Illinois 62901

*Detecting interspecific hybrids in the panic grasses (Dichanthelium, Poaceae)*

Dichanthelium is a genus of perennial grasses that occurs throughout eastern North America, and can be found locally in Carbondale and the greater Illinois area. The biogeography of Dichanthelium spans to areas in South America, and some species are located in Hawaii. Taxonomically, Dichanthelium has changed in the past 40 years, and was formerly a subgenus of the Panicum. Due to the lack of molecular analysis, the purpose of this study is to resolve evolutionary relationships of this widely dispersed grass. In the course of their study, some collected specimens had polymorphic sequences revealing a possible hybrid nature. These sporadic collections show that there are likely rare hybrids within the landscape of eastern North America. Also, there is a species of hybrid origin (*D. hillebrandianum*) in Hawaii originating from the sympatric Hawaiian species *D. cynodon* and *D. isachnoides*. This study highlights the importance of understanding hybridization in the evolutionary process.

**Tasha Swenney and Michael Hylin, Ph.D.**

Department of Psychology

*Traumatic Brain Injury and Granular Cell morphology in the Dentate Gyrus*

Traumatic Brain injury can affect anyone and can range anywhere from mild to severe. In order to understand these injuries and their consequences better, neuronal networks distal to the injury need to be considered. In this study, rats were used as a model organism to investigate the effects of traumatic brain injury of the prefrontal cortex. These rats were injured at 17 days old and were then tested later in life using the dig task, the T-maze and the Morris water maze. The data from these tests revealed that deficits were present for some tasks and not others. The brains from these rats were then stained using the Golgi- Cox method in order to examine the morphology of granular neurons in the dentate gyrus. These neurons will potentially help to determine what effects the prefrontal injury has upon neurons in the hippocampal network. The dentate gyrus is a region of the hippocampus where neurogenesis occurs and the granular neurons can shed light on this aspect of the brain as well. Analysis will examine the dendritic branch complexity of the neurons by measuring the length and number of branch points, as well as, the spine density on terminal branches. The results will potentially show that the injured rats were able to compensate for their injury in other regions of the brain in order to make up for the injury in the prefrontal cortex. If this is the case, the granular neurons in the injured rats should have more dendritic branches and be more complex versus those in the sham rats.

**Austin Szubryt<sup>1</sup>, Wei Rang<sup>2</sup>, Dr. Geisler-Lee<sup>1</sup>**

Plant Biology<sup>1</sup>, Computer Science<sup>2</sup>

*Conspecific Competition in Arabidopsis thaliana*

Due to limited resources, plants compete amongst each other for light, water, and nutrients. Our research sought to determine how plants respond to reduced nutrient and competition stresses in early development by examining aboveground shoot and subterranean root systems.

Four treatments were established to determine the effects of reduced nutrients and conspecific (same species) root exudate on growth. Five positions were determined for each container, one in the center and four corner positions. Four boxes had varying gel media or soil conditions: one with diminished nutrient quantities (Low), one with reduced nutrients and previous root exudates present (High), a procedural control with the media removed and immediately replaced, and a box with five undisturbed plants (control). Two corner positions were disrupted for the Low, High, and Procedural Control treatments.

The effects on shoot growth were measured by recording life cycle stages and rosette diameters at 19, 21, 26, and 28 days after planting (DAP). The data from this and inorganic extractable nitrogen ( $\text{NO}_2^-/\text{NO}_3^-/\text{NH}_4^+$ ) information indicate that the control box center plants grew the most and used the most nitrogen, relatively. These results also show the Low boxes growing slightly less and the Heavy boxes even less than the Low although these were insignificantly different. The Procedural Control showed significantly less growth between days 26 and 28. Our root growth data is being processed by converting images into three-dimensional representations.

So far, root exudates appear to alter overall growth. Our primary objective was to discover how much root exudates affect root and shoot growth. Our inferences thus far indicate that the plants respond to conspecific root exudates early in development and alter resource allocation to a small degree.

**Jordan Taylor**

WSIU Public Television

*Undergraduate Assistant with WSIU Public Television*

My name is Jordan Taylor. I am an Undergraduate Assistant with WSIU Public Television. I have many responsibilities as Studio Supervisor in the Communications Building where many tv programs are shot.

As a Studio Supervisor, I am constantly in the different studios doing various jobs. From working on a show to just cleaning up and keeping everything together. While also studying the art of television production, I'm able to utilize my skills and training everyday during River Region Evening Edition. This is the award winning student newscast here on campus. That is what takes most of my time. I am one of the leading Technical students that work for WSIU. I know the ins and outs the studio and control room. I spend most of my time preparing both places for the live newscast at 5. Each day, my job varies. One day I'm the Technical Director, a Director, a Producer, and Weathercaster.

I also train many students to do all the different jobs that it takes to put on a show because I can't be in two places at once and it's important that more than one person can do each job successfully. I take great pride in passing on the torch from me doing the job to someone else so that I can focus more on putting out fires as they arise. In this business, things always go wrong and I think I handle it very well when things need to be handled.

Just being a sophomore, I have redesigned a program that has been in place for over 45 years. I have redesigned the weather department and the graphics. I've created a introduction to the live program as well as created small things that have a big impact in the show.

I take my job very seriously and I think that's why I am so far ahead in my education. I've been in television for 8 years now and I can say i've enjoyed everything I've done. This program is outstanding and certainly lives up to all the awards it has received.

**Carlos Teran**

Pre-Civil Engineering Program

*Solar Cell Research*

The research is working with different types of materials like Titanium Carbide (TiC) for example, to create nanofibers with the goal of improving the solar cells efficiency to use the solar energy to create electrical energy. For the moment we are still working with the experiments so there are no clear results for now; since there are some materials that we have not experimented yet, we don't know what to expect for the results because is something completely new in the research field. This experiment requires time to get to some concrete results, and right now the research is still in the experimenting phase. We are looking forward to keep the experiments going until we use all the materials that are expected to be studied, and compare all the results to observe the different chemical behaviors to decide which possibilities the experiments have to improve this system.

**Andrew Thomas**

Aviation Flight

*Renewable Energy in Aviation Training Environments*

The purpose of this presentation is to address the merging of two major topics in modern society: renewable energy and the aviation industry, specifically in the training environment. This undergraduate research presentation portrays the feasibility, availability, and opportunity associated with alternative energy-powered aircraft in the training environment. The focus is on the long-term investment of a renewable-energy aircraft fleet in the FAR Part 141 training environment amongst several aviation universities in the United States, and the finances related with the purchasing and maintenance of such training aircraft fleets. The investigation included an evaluation of the financial constraints that aviation universities face, the requirements of the fleet as a whole, and the future of said transactions through maintenance considerations, both financially and resourcefully. These conclusions were reached through interviews with university officials and a thorough analysis of fiscal limitations and considerations among aviation flight programs under the 141 training curriculum. Although findings favoring more innovative renewable energy were inconclusive for the immediate future, the decades to come are promising as expected challenges of increasing fossil fuels cost and more heavily regulated carbon dioxide emissions are addressed through expanding technological advances.

**Jorden Thomas, and Dr. Chad E. Drake**

Department of Psychology

*Does the Implicit Relational Assessment Procedure Predict Interaction with People Diagnosed with Attention-deficit/Hyperactivity Disorder?*

The purpose of the current study is to examine the differences between implicit and explicit stigmatizing views of people who have been diagnosed with ADHD. Implicit (i.e., automatic thoughts) views will be measured by using the Implicit Relational Assessment Procedure (IRAP; Vahey, Barnes-Holmes, & Barnes-Holmes, 2009), and explicit views (i.e., controlled thoughts) will be measured by self-report questionnaires that have been adapted for this study. The participants for this study will be a convenience sample of introductory psychology students from a large Midwestern university. The students will first answer four self-report surveys to assess their explicit thoughts of ADHD stigma, followed by the completion of an IRAP tailored to judge their implicit thoughts. Along with the self-report surveys, the participants will read two gender-matched vignettes of characters that exhibit ADHD-like symptoms. One vignette character does not receive professional treatment, thus being labeled as healthy. The other vignette character will have received treatment by a psychiatrist and be labeled as sick. The IRAP records the latency response time of the consistent and inconsistent rules presented before each trial block. After the IRAP, students will complete the Social Distance Scale (SDS; Bogardus, 1933) adapted for this study to measure their willingness to interact with a person non-diagnosed and diagnosed with ADHD. It is hypothesized that the IRAP will show the participants' D-IRAP scores and questionnaire scores as having a pro-non-diagnosed bias. It is also hypothesized that the IRAP scores will predict the outcome of the participant's score on the SDS. Students are expected to exhibit a greater social distance to those who have been diagnosed with a mental disorder, than to those having no disorder.

**Isaiah Thompson and Dr. Chad E. Drake**

Department of Psychology

*The Implicit Relational Assessment Procedure as a Measure of Stigmatizing Attitudes About Posttraumatic Stress Disorder*

Mental illness stigma is a widespread phenomenon that has a negative impact on how our society treats its members who are suffering from a mental disorder. While there are some general stereotypes that are held for all mental disorders, there are several that apply to particular disorders. Self-report measures have been used to assess participants' attitudes toward a person described in a vignette representative of an individual with a particular disorder. One of the difficulties with this design is that the responses may not be representative of the participants' attitude toward an individual with the disorder. The Implicit Relational Assessment Procedure (IRAP; Vahey et al., 2009) is a reliable and valid measure of implicit attitudes of which the participant is often unaware. Nine self-report measures will be administered in the current study, followed by an IRAP involving positive and negative words in association with a vignette depicting an individual with PTSD. The participant will then complete the Social Distance Scale (Bogardus, 1933) with regard to the person described in the vignette. It is hypothesized that IRAP scores indicating a negative attitude toward mental disorders will be predictive of higher social distance.

*Keywords:* mental health stigma, posttraumatic stress disorder, IRAP, social distance, Implicit Relational Assessment Procedure, bias, mental illness, stigma



**Naomi Tolbert and Chris Stout**

Department of Political Science

*Unequal Access: Factors Contributing to the Disproportional Representation of Marginalized Groups within Study Abroad Programs*

Previous research shows that success driven programs can change a student's outlook on life and shape their opportunities for the future. However, the use of these programs is not evenly distributed. In this project, I explored whether minorities and low income white students attending institutions of higher education utilized success driven programs, such as study abroad, less than more affluent whites. I surveyed a variety of participants using Amazon Mechanical Turk (MTurk). The instrument consisted of 33 questions and included 400 respondents who were current or recent college students. I expected that socio-economic status, family obligations, and fear of discrimination would negatively impact study abroad participation. Results from this study provided insight to address racial and social inequalities in study abroad programs.

**Luis Trevino-Pena and Andrew Youpa**

Department of Philosophy-Sociology

*Physician-assisted suicide: Addressing the “right to die” argument*

Since 1997, when Oregon became the first state in the United States to legalize physician-assisted suicide (PAS), two more states, Washington and Vermont, have also legalized PAS. Additionally, proponents of PAS have often used and continue to use the “right to die” argument to promote the enactment of bills legalizing PAS in states throughout the United States. In this project, I defined the “right to die” argument as an argument that stands on the basis of two claims: 1) the claim that human beings have a right to have a “death with dignity” and 2) the claim that human beings are naturally autonomous. I discussed both of these claims individually through the existing literature on the topic, and I addressed the “right to die” argument as a whole. Subsequently, I argued against the validity of the “right to die” argument, especially when used to justify the current and future legalization of PAS in the United States. Finally, I concluded by emphasizing the need for revising our societal idea of the concepts of human dignity and autonomy, specifically when related to PAS and as defined by the “right to die” argument.

**Noppadol Tuksakulvith and Karen Martin**

Dunn-Richmond Economic Development Center

*Southern Illinois: a potential industry cluster.*

BLACE is a collaboration project between the Office of Economic & Regional Development and English as a Second Language. One of the program's purposes is to increase economic development activities in southern Illinois. Looking at the region, southern Illinois offers tremendous benefits in terms of transportation, cost of living, infrastructure, etc. Site selection can be a long and complicated process; firms are looking at what the region currently has and what it has to offer. An industry cluster bubble chart is one of many tools a company can use, it captures the density (location quotient), employment (employment quotient), and changes in the location quotient. Automobile companies in the Midwest and technology companies in the Silicon Valley are the very examples of industry clusters. From a supply chain perspective, customer and supplier's relationship, transportation, talent resource, and infrastructure have been established by the existing firms. In addition, when many companies are located in the same area, the flow of information improves due to customers and suppliers sharing information, which can lead to better product development process. From an economic development perspective, cluster of firms helps improve local economy and quality of workforce. Increasing economic activities require regional collaboration and sustainable effort to keep the economic development activities in the region.

**Cailey Vandermark, Elliott Zieman, Esmarie Boyles<sup>1</sup>, Clayton K. Nielsen<sup>1,2</sup> and F. Agustin Jimenez**

Department of Zoology, <sup>1</sup>Cooperative Wildlife Research Laboratory, <sup>2</sup>Forestry

*Trypanosoma cruzi* infections in raccoons but not bobcats from southern Illinois

*Trypanosoma cruzi*, a protozoan parasite endemic to the New World, is the etiological agent of Chagas disease, a Neglected Tropical Disease that can be extremely debilitating and potentially deadly. Chagas disease itself is considered non-endemic in the United States due to the rarity of human cases within that territory. Trypomastigotes of *T. cruzi* are transferred via feces of kissing bugs (*Triatoma* spp.) to homeothermic animals, commonly raccoons and opossums. Once infected, the parasite disseminates through the blood to tissues where it forms pseudocysts containing amastigotes. These pseudocysts may form in cardiac muscle and cause chronic disease. *Triatoma sanguisuga*, a known vector for the parasite that is present in southern Illinois, was not detected in previous prospections. With the development and use of molecular techniques, the parasite has been detected in Georgia, Tennessee, Kentucky, and Missouri, among several other states. The purpose of this work is to determine the presence and prevalence of *T. cruzi* infections in representative mesocarnivores of southern Illinois.

DNA from heart, muscle, and spleen of bobcats and raccoons was extracted and screened for the presence of *Trypanosoma cruzi*. The 195-basepair satellite repeat and kinetoplast minicircle DNA were targeted using two sets of primers specific to *T. cruzi* and were amplified by polymerase chain reaction. A total of 60 bobcats tested negative, whereas six out of 26 raccoons tested positive for *T. cruzi*. Thus, prevalence in the tested raccoons was 23%.

These results demonstrate that *Trypanosoma cruzi* is present and potentially transmissible to raccoons in southern Illinois. Determining the presence of *T. cruzi* is crucial in estimating the risk of vector-borne transmission of *T. cruzi* within the United States.

**Grace Vargas, Andrea Storey and Dr. Alejandro Caceres**

Department of Languages, Spanish

*The Life and Works of Reinaldo Arenas*

Dr. Alejandro Cáceres of the Spanish department has been studying the works of Cuban writer Reinaldo Arenas, and the political and social implications of his novels and short stories. Arenas's style is such that his work is mostly either abstract or direct recounting of his biographical life story. In addition to critically analyzing the literature produced by Arenas himself, there exists a need for contextualizing the situation wherein the work was produced. Dr. Cáceres already has made a significant amount of progress with research and analysis, specifically focusing on the recurrence throughout Arenas's works of the themes of "spirituality" and "alienation."

Our roles as undergraduate assistants consist of aiding Dr. Cáceres by supplementing his research by expanding the amount of sources for his bibliography and increasing the variety of perspectives and topics. Through these new sources, we can help to find new angles to study the life and times of Arenas, and provide our own informed opinion and advice on the synthesis that Cáceres is compiling. We are processing the work of others, and creating our own analyses in both English and Spanish.

Currently, we are reading Arenas's novels and poems, gathering biographical information about his life, studying Latin American writing, and literary technique. We are also researching more about the topics of politics in Cuba, LGBTQ history, AIDS and Arenas's reputation. We are excited and honored to be a part of this project

**William Vignovich and Dr. Kurt Neubig**

Department of Plant Biology

*The biogeography of the unresolved panic grasses (Dichantheium, Poaceae): an unusual distribution of disjunct eastern North American and Hawaiian taxa*

The genus *Dichantheium* is a phylogenetically poorly resolved taxon originally grouped within the genus *Panicum* in the grass family (Poaceae). This widespread group mainly inhabits North America; however there is multiple instances of this genus also living in tropical areas in Central and South America as well as in the Hawaiian Islands. The purpose of this research is to study the biogeographical distribution of the Hawaiian representatives of this species as these represent a very unusual biogeographic pattern. We used analysis of 3 DNA regions *GBSSI*, nrITS, and *rpl32-trnL* intergenic spacer to develop a phylogenetic hypothesis of relationships in the genus for both Hawaiian and North American species. These results indicate that the Hawaiian species form a clade (they are each other's closest relatives) and that they most likely arrive via dispersal from a North American ancestor. By determining the interrelationship of evolutionary processes and geographic distribution, we can form a greater understanding of diversification patterns in the landscape.

**Taylor Voegel, Sarah Merino, and Stacy Thompson, Ph.D.**

Curriculum and Instruction

*Projections of Early Adults' Identities*

College is a time to explore options, try new things, and discover more about oneself. The purpose of the current study is to learn more about role expectations for a young adult's future career, marital, and parental identities as well as what influences shape these expectations. This knowledge will explore how an individual's identity is formed across time. Not only will this study help further the understanding of young adults' identities, but also how the importance of knowing their identities affects them. We will gather data on these issues of identity formation from undergraduate students (ages 18-22 years old) at a Midwestern University through the use of questionnaires. For recruitment, we will seek permission from cooperating and willing professors and instructors at SIUC to speak with their classes, post recruitment flyers around campus, and use word of mouth to find more subjects. The measures will provide more understanding of how young adults form their identities through influences of roles, future expectations, satisfaction of future responsibilities/roles, and their identity with others.

**Andrew Walker, Asma Alkabsh, Hassana Samassekou, Saikat Talapatra, Dipanjan Mazumdar**

Department of Physics, Southern Illinois University Carbondale

*Identifying Optical Properties of MoS<sub>2</sub> Heterostructures*

Materials labeled Transition Metal Dichalcogenides (TMDCs) such as MoS<sub>2</sub> are optimal for application in optoelectronics, and have allowed for new fields of physics such as valleytronics. MoS<sub>2</sub> is being explored as possible substitute for Silicon as materials which yield increases in performance with lower energy demands. The TMDC has a direct band gap at the K-point in monolayer scale, this band gap value will not in the bulk form of the material. TMDCs are generally developed using CVD (Chemical), however there has been little efforts to form the materials using PVD (Physical). The optical properties of the MoS<sub>2</sub> prepared by this research group will be examined using the WVASE 3000 system, and an empirical model will be formed to the data from which the optical properties can be interpreted. The characteristics of the TMDCs will be further explored as the configuration is changed, for example the wide-gap BN insulator is incorporated which will affect the behavior of the system. Spectroscopic ellipsometry will account for deviations in the intensity and polarization of the incident light ( $\Psi$  and  $\Delta$ ). The obtained values for the material will allow the model to implicitly determine all other optical constants by exploiting the Kramers-Kronig relationship. The obtained data can then be compared to the theoretical data to gauge if there is any correlation between the theoretical and experimental approaches to exploring the subject material.



**Emily A Walters and Deborah A. Bruns, Ph.D.**

Department of Counseling, Quantitative Methods, and Special Education.

*Frequencies and treatment of Apnea in 90 cases with Trisomy 18*

Trisomy 18 (Edwards syndrome) is a chromosomal disorder that is due to an extra chromosome 18 (Jones, Jones, & Campo, 2013). Trisomy 18 is the most common trisomy disorder after trisomy 21 (Down syndrome). Individuals with trisomy 18 are thought to have limited capacity for survival (Courtwright et al., 2011; Derrington and Dworetz, 2011; Yates et al., 2011). A primary factor in early death is apnea (Kosho et al., 2006). The objective of the study was to review 90 cases with full trisomy 18 focusing on the presence and treatment of apnea (central or obstructive) in two time period (in the past including infancy and early childhood and at the time of survey completion).

Of the 90 cases, 68 (75.6%) were living at the time of completion. Mean age was 67.4 months (range 2-394 months). The age range for cases who had passed away prior to survey completion was 2-301 months ( $\bar{x}=62.4$  months). The majority of participants lived in the United States ( $n=74, 82.2\%$ ).

Preliminary results indicated the presence of apnea, (temporary cessation of breathing), was more frequent in the past than at time of survey completion. Specifically, in the past, 47 cases had apnea ( $n=86, 54.7\%$ ). At the time of survey completion, apnea was reported in 20 cases ( $n=73, 27.3\%$ ). Central apnea was more prevalent in the past as identified in 26 cases ( $n=55, 47.3\%$ ). For those participants who still reported apnea ( $n=20, 27.3\%$ ) obstructive apnea was more prevalent at the time of survey completion ( $n=73, 27.3\%$ ). Treatments that were identified to treat apnea included caffeine, adenoidectomy, tonsillectomy, and uvulotomy. Limitations will be described. Recommendations and implications will be provided.

**Kevin G. Wang and Michael W. Olson**

Department of Kinesiology

*Mode of Neuromuscular Fatigue Indicates Response of The Antagonist Muscles Surrounding the Knee Joint*

Coactivation of the antagonist muscles surrounding the knee joint provides information in determining the contribution of each muscle group to the stability of the knee joint. Previous work has included different modes to evaluate muscle function during movement: isometric, isotonic, and isokinetic. Each one has specific advantages in evaluating the contribution of the muscle to movement parameters.

**Purpose:** To evaluate the muscle activity of the muscles surrounding the knee joint during a fatiguing isokinetic flexion-extension movement. **Methods:** Eight individuals ( $21 \pm 2$  yrs,  $74 \pm 10$  kg, and  $1.71 \pm 0.8$ m) participated. Participants performed maximal voluntary isometric flexion and extension efforts (MVIE) prior to the fatigue protocol. Surface electromyography (EMG) were collected from rectus femoris, vastus lateralis, vastus medialis, semimembranosus, and biceps femoris muscle groups on the self-selected dominant limb. Participants were seated upright and secured in a chair with the dominant limb secured to an attachment arm of the isokinetic dynamometer. Participants were to perform flexion and extension at the knee joint in two different conditions: active and passive. The active condition required the participant to perform the task volitionally in flexion and extension, while the passive condition required a volitional extension and passive (machine controlled) flexion. This was done to test the idea that level of fatigue is specific to the type of mode used to induce neuromuscular and mechanical fatigues. Participants performed flexion-extension movements at 90 deg/s for up to 5 min. After the 5 min of flexion-extension, participants then performed MVIE, similar to the start of the experiment. A one-way ANOVA was used to assess differences between force and EMG variables in pre and post fatigue MVIE during flexion and extension. Alpha was set at 0.05. **Results:** Torque output in both conditions was significantly reduced over the 5 min of extension ( $p < 0.05$ ). Activities from the muscles groups did not change significantly during either fatigue session ( $p > 0.05$ ). Hamstring muscles activity was greater after active flexion during post-MVIE compared to passive flexion ( $p < 0.05$ ).

**Discussion/Conclusion:** Both modes of inducing muscle fatigue in the quadriceps muscles were sufficient. Activation of the hamstring muscles was dependent upon the mode of action during fatigue protocols and may provide additional information regarding the synergistic activation of the muscles surrounding the knee.

**Austin Weigle, Adviser: Dr. Aldwin Anterola**

Department of Plant Biology

*Differentiating Anticancer and Carcinogenic Pathways by Comparative Gene Expression Analysis*

Indigo is well known for its use as a dye, but the biosynthetic process that leads to its production in plants has the potential to serve another purpose: treating cancer. *Isatis tinctoria* (dyer's woad) manufactures indigo along with a structurally similar compound, indirubin. Indirubin has been shown to prevent the growth and development of cancerous cells. In a bifurcating pathway, indigo and indirubin are synthesized from indole alongside tryptophan. It is still uncertain which specific enzymes are involved in each pathway. Structural isomers of tryptophan synthase (TSA1, TSA2 and TSB) are suspect for involvement, as well as one or more P450s. Gene expression levels of TS genes, along with those of P450 genes ItB4 and ItB24, were measured to determine responsibility for indigoid biosynthesis. RT-PCR implementing novel and universal reference genes discerned correlative and tissue-specific regulation between the genes when treated with various stresses (methyl jasmonate, cold, drought and wounding). RefFinder pairwise analysis of raw amplification revealed novel genes as being the most stable across all data pools. Normalization of target gene amplification against stable reference genes suggested TSA1 was upregulated in leaf cDNA, while ItB24 exhibited similar, though reduced, expression patterns. In root tissues, ItB24 was significantly downregulated in response to methyl jasmonate treatment. Remaining genes did not appear to display significant changes across all treatments relative to control. RefFinder analysis of leaf expression data yielded ItB4 as most stable and TSA1 as least stable; root expression data yielded TSB as most stable and ItB24 as the least stable. Distance correlation analysis suggested that while all expression is tissue-dependent, TSA2, TSB and ItB4 appear to express nearly independently across leaf and root tissues, questioning their role in indigoid biosynthesis. Correlation between TSA1 and ItB24, expression and significantly greater dependence across tissue treatment suggests their upstream involvement in indigoid biosynthesis.

**Dylann Wilkinson, Advisor: Dr. Sarah Kertz**

Department of Psychology

*Relations Between Parent and Child Information Processing Deficits and Anxiety*

Although anxiety disorders are one of the most common forms of psychopathology in children, research has focused primarily on adult populations and there are limited treatment options for children and adolescents (Kessler, 2005). Parent anxiety predicts child anxiety (Turner, Beidel, & Costello, 1987); however, the mechanism by which risk for anxiety is conferred remains largely understudied. Information processing deficits relate to attentional biases for threat, or the idea that those with anxiety disorders are more likely to attend to dangerous or threatening information (Kertz & Woodruff-Borden, 2011). One possible hypothesis for information processing biases is cognitive control, which is important for orienting and directing attention. However, the exact relations between information processing bias and cognitive control are not well understood. Information processing problems and cognitive control deficits may contribute to observed relations between parent and child anxiety. Little is known about the relations between parent and child information processing biases and cognitive control deficits, or if parental deficits confer risk for the development of anxiety in children. Using a sample of parent-child pairs, the proposed study has two primary goals: (1) to explore the relations between parent and child information processing, cognitive control, and anxiety and (2) to examine if parent information processing or cognitive control deficits mediate the relations between parent and child anxiety. Cognitive bias modification programs targeting deficits in parents and children may prevent the development of anxiety in at risk children.

**Cody Yarnell, Jocelyn Rothschild-Frey, and Juliane Wallace**

FACSM Kinesiology, Southern Illinois University, Carbondale, Illinois

*Physical Predictors of Limb Venous Compliance: A Correlational Study*

Similar to changes in arterial compliance with fitness and aging, venous compliance in the lower extremities of adults improves with higher fitness and declines with increasing age. In young adults, males have a higher venous compliance than females, a difference that does not appear related to hormonal fluctuations. Most of the previous studies have used small groups to make these comparisons, this is the first study to look at the relationship among the variables that influence venous compliance in a larger sample **PURPOSE:** To determine which anthropometric and physical variable predict calf venous compliance in adults. **METHODS:** 173 individuals (71 females and 102 males) volunteered for this investigation. Participants underwent anthropometric assessment, a submaximal graded exercise test, and assessment of calf venous compliance. Utilizing venous occlusion plethysmography, calf pressure-volume relations were determined using the quadratic regression equation  $[(\Delta\text{limb volume}) = \beta_0 + \beta_1 * (\text{cuff pressure}) + \beta_2 * (\text{cuff pressure})^2]$ . Calf venous compliance was calculated as the first derivative of the pressure-volume relation during cuff pressure reduction. Capacitance and capillary filtration volumes were determined from the increase in limb volume following cuff pressure inflation. Anthropometric and fitness variables were compared to venous compliance at 20mmHg using a linear stepwise multiple regression. **RESULTS:** Body mass, stature, body mass index, body fat %, diastolic blood pressure, and resting heart rate were significantly associated with lower limb venous compliance ( $R^2=.265$ ;  $p<0.001$ ). Body mass ( $R^2=0.05$ ;  $p=0.009$ ) and body fat % ( $R^2=0.125$ ;  $p<0.0001$ ) together explain the majority of the variance in venous compliance. Surprisingly, there were no significant relationships identified between age, fitness, or systolic blood pressure and compliance at 20mmHg. **CONCLUSION:** This is the first study to show the influence of body mass and fat on calf venous compliance.

**Stephania Zneimer<sup>1</sup>, Liliana Lefticariu<sup>1</sup>, Mihai Lefticariu<sup>2</sup>**

<sup>1</sup>Department of Geology, Southern Illinois University

<sup>2</sup>Mass Spectrometry Department, Southern Illinois University

*Distinguishing between different hydrologic processes and their fractionation effects within the isotopic signature of the Southern Illinois Locality.*

This study pertains to understanding the recent climatic changes occurring in Southern Illinois with regards to extreme weather events. This study utilized stable water isotopologues in characterizing a relationship between the temporal distribution of  $\delta^{18}\text{O}$  and  $\delta\text{D}$  in precipitation within oceanic air masses and local evapotranspirative processes and determines if there exists a causal relationship between the two and specifically how each contributes to the fractionation of stable water isotopologues.

Reported are the stable isotope values of individual precipitation events in Carbondale, Illinois measured from November 2012 to December 2015. Carbondale is located in Midwestern United States and has an increase in topography in southern Illinois which is thought to increase annual precipitation from ten to fifteen percent than the counterpoints in the maximum low of the basin. Our results show that, the average local meteoric water line has a slope of 7.8 and an intercept of 12.4, values similar to those of the GMWL. Precipitation isotopic and deuterium excess (d-excess) values show clear seasonality. The events with larger volume of precipitation had enriched isotopic signature and small or negative d-excess values, suggesting the input of moisture originated from Gulf of Mexico. However, the majority of precipitation events were smaller volumes, had a wide range of isotopic values and d-excess greater than 5, suggesting that a major component was moisture originating from evapotranspiration and evaporation from the soil. Since most of the surface water is stored in soil and vegetation, changes in the amount as well as transfer rates among these reservoirs can have a significant effect on the regional land-atmosphere water fluxes with direct implications on economic activities.

# Creative and Scholarly Saluki Rookies



**Kelechi Agwuncha**

Department of Cinema & Photography

*A Comparison of Racelifting and Cultural Appropriation in Today's Popular Culture*

Racelifting is defined “whereby characters written as one ethnicity are played by an actor of another”. The criticalness of racelifting is dependent on audiences via social media and forums along with the film/television industry’s acknowledgement of the United Colours of Benetton, an act carried out to increase earnings. Kayla Kumari Upadhyaya of the A.V. Club speaks of the scarcity of diversity in the TV/Film industry. “Mainstream is Hollywood’s favorite euphemism for white people” Upadhyaya states.

Racelifting consist historically of Hollywood “blackening” up actors. Black actors are cast to play characters originally written as white. Racelifting is practices, reason being studios and producers recognize the economical rational of casting black characters, but not leads. Few racelifting cases create a black main role according to Marissa Lee of “Racebending”, an organization that pushes for equality in terms of opportunity. An Indiana University research revealed that white audiences are more prone to watching films with white leads, as those those with black leads are believed to be geared for black audiences. Professor Weaver, director of the study adds that “movie producers are often reluctant to cast more than a few minority actors in race neutral movies for fear that white audience will largely avoid such films.”

People in entertainment must acknowledge the history of what they document and not be dismissive of the impact that very culture has had on modern civilization. The film industry must favor authenticity over cultural appropriation.



**Alexander Bertrand**

Department of English

*The Recent Struggle of Liberal Arts Against a Scientific Society*

By looking at academia over the course of recent history, certain trends can be noticed. One of the most notable trends is the stigma applied to majoring in liberal arts. Most all of the STEM (science, technology, engineering, and mathematics) majors are being pushed towards students because it has been said that those are the majors that attract jobs. In a report by The Washington Post, titled “Why America’s Obsession with STEM Education is Dangerous,” the journalist says the following to attempt to capture America’s condemnation of liberal arts education:

*“America’s last bipartisan cause is this: A liberal education is irrelevant, and technical training is the new path forward. It is the only way, we are told, to ensure that Americans survive in an age defined by technology and shaped by global competition.”* Politicians today are more concerned with raising scores in the math and science portions of standardized tests than ensuring their students are well rounded. Quoted in the before mentioned article, Florida’s governor, Rick Scott poses the question: *“Is it a vital interest of the state to have more anthropologists?”* To further his point, he answers his rhetorical question by simply saying: *“I don’t think so.”* Are the liberal and fine arts not worth keeping in classrooms? If one decided to major in a liberal art, are they truly not worth as much as someone who chose a STEM field to the job market?

Taking these negative viewpoints into consideration, the research for this project is aimed at proving the worth of a liberal arts education in this scientific world and the project which is being conducted is aimed at cultivating the interests of liberal arts in the local high school communities.

**Alex Bielawa and Bruce DeVantier, PhD, PE, DWRE**

Department of Civil and Environmental Engineering

*Activated Sludge Processes and Biological Denitrification*

The goal of wastewater treatment is to purify water of all solids and harmful nutrients to safely return back into receiving streams. As the human population continues to increase nitrogen levels in water, with a greater percentage of these levels rising in the Midwest, many plants throughout the region are looking for ways to eliminate the high levels of nitrogen. I investigated and conducted a literature study on the effects and relationships between activated waste sludge and biological denitrification. Throughout the continuous Nitrogen Cycle, the only step that “closes” the cycle is denitrification, which by definition, reduces the nitrates to nitrites to nitrogen gas. Denitrification occurs naturally throughout aquatic systems, but is very time consuming comparable to other oxidation methods; wastewater engineers have established ways to greatly increase the rate that denitrification occurs throughout wastewater plants. Many factors influence denitrification: the amount of oxygen present, the pH of the activated sludge, and the temperature. Ideal conditions for this process are very low to little levels of oxygen (anoxic states), and slightly neutral pH levels. Activated sludge is loaded with many different types of bacteria, many of which can be used throughout denitrification, an example being *Pseudomonas spp*, a complete denitrifier. In the process of my investigation, I found that roughly 5% of the 17,749 treatment plants in the nation exercise nitrogen removal from its wastewater; two of the biggest states dealing with increased nitrogen levels are Wisconsin and Pennsylvania; nearly every plant in these states is removing the nitrogen from rich agricultural activities. There are many advantages to activated sludge denitrification: protecting the quality of the return water, returning alkalinity back to the treated water, and preventing both eutrophication and toxicity of the aquatic ecosystem. When denitrification begins to transform the nitrates into nitrites and eventually nitrogen gas, most of the organic carbon has been depleted from nitrification, so an organic carbon is added into the sludge to maximize the amount of nitrogen removed. Here in Carbondale, the carbon source for denitrification is supplied directly to the activated sludge process without primary settling.

**Nicole Fuller and Dr. Keith T. Gagnon, Ph.D.**

Department of Chemistry and Biochemistry

*CRISPR-Cas9 Mutagenesis For Increased Fidelity and Reduced Off-Target Effects*

An interest in the CRISPR-Cas9 enzyme began when its genomic editing ability for a wide array of genetic sequences was discovered. Since this development, a main obstacle found in utilizing this enzyme and its variants are its potential off-target effects. Additional unintentional edits to the genome could cause severe and unknown effects in cellular function. This obstacle must be confronted in order for CRISPR-Cas9 to become a plausible gene therapy tool. Our laboratory is developing CRISPR-Cas9 as a generalized laboratory tool as well as a potential therapeutic approach for neurological repeat expansion disorders. Recent experiments by Kleinstiver et al. (2016) show that four specific mutations in the Cas9 enzyme produce greatly reduced off-target effects and a higher specificity for the desired genome sequence. We will generate Cas9 enzymes with these specific mutations using site-directed mutagenesis. Recreating these new Cas9 mutants will allow for further testing of their genomic editing effectiveness and possible discovery of other new qualities, specifically with respect to repeat expansion targeting. Furthermore, their improved effectiveness may improve the results of other related studies in the lab, including basic investigations into CRISPR-Cas9 catalytic activity. Ultimately, improvements in the specificity and activity of Cas9 will impact its potential as a gene therapy approach.

**Megan Hall and Andrey Soares, Ph.D.**

Department of Linguistics and School of Information Systems and Applied Technologies

*Transfer of Dr. Joan M. Davis's Tobacco Education website from Joomla to Wordpress*

Effective websites are important resources in this era, so it is important to keep any relevant website up to date for the target audience. Part of ensuring that a website is effective is hosting it on a proper platform. Dr. Joan M. Davis of ASA School of Allied Health has a tobacco education website, available at [tobaccofree.siu.edu](http://tobaccofree.siu.edu), and she needed it transferred from its previous hosting site, Joomla, to Wordpress so as to comply both with requirements for SIU-affiliated websites and with the needs of the educators, students, and practitioners who use the site. Objectives include uploading information from the old site; keeping track of user data; restricting what parts of the website each level of user can access; and making all of this user-friendly and compliant with SIU brand requirements.

To accomplish this, Dr. Soares and I met with Dr. Davis to determine exactly what functions, information, and aesthetic her website needed to have. We created a wishlist and planned the order of the process. In order to keep the website available while the new version was being created, a “sandbox” site was set up to allow us to research and experiment with different options without interfering with the old website. An appropriate theme had to be selected first, and then functional plugins had to be added, from video hosting to downloadable content to user registration. When the new website is fully functional, it will be made available to the public and old users will be contacted so that they can confirm their accounts and use the updated website

**Samantha Hennig and Dr. Charla Lautar**

## Dental Hygiene

*Dental Implications of the Affordable Care Act*

In the last fifteen years, there has been much attention regarding disparities in oral health among population groups. Additionally, there has been recognition that the oral cavity can be a reflection of the body. There is a strong relationship of oral disease to systemic disease. At the same time in the United States, there has been an attempt at major health care reform with the Affordable Care Act (ACA). This legislation falls short in recognizing the need for dental care as part of comprehensive medical care. The purpose of this study was to investigate the dental implications of the Affordable Care Act. An investigation was conducted by means of a literature review of government websites, professional dental literature and other applicable resources. The ACA has failed to address oral health care needs and disparities, of not only the underserved, but also the general population. Though the Act increased health care coverage for all ages, dental coverage did not receive the same increase. Additional dental coverage was implemented for young children in the Medicaid system, in particularly dental preventive procedures. Due to an increase in medical insurance coverage, there was a correlation in patient numbers, creating a need for expansion of the health care workforce. The midlevel health care professional workforce is growing and receiving more recognition as a primary care provider than it had before the ACA. Yet the same beneficial outcomes in regards to coverage and workforce have not been observed within the oral health care community.

**Kaitlyn Hutson, Tayler Hill, David Pice, Hannah Lepird, Sean D. Moran, Ph.D.**

Department of Chemistry and Biochemistry

*Predicting enzyme activity using infrared spectroscopy labels.*

Enzyme activity is usually calculated using an equation of moles of substrate converted per unit time = rate  $\times$  reaction volume and is dependent on reaction conditions such as temperature. In order to simplify the reaction we isolated the conversion step by covalently bonding the substrate to the active site of the enzyme. This allows the viewing of first order kinetics and gives us the ability to measure the rate of the reaction using ultraviolet-visible spectroscopy (UV-vis) and fluorescence spectroscopy. We are trying to determine if bond vibrations detected using two dimensional infrared spectroscopy (2D IR) directly correlate to enzyme activity by comparing it to a loss of conjugation measured by UV-vis which is directly related to enzyme activity. By slightly modifying the 2D IR label attached to the enzyme we have optimized it for UV-vis without changing the way the substrate bonds to the active site. The label optimized for UV-vis reacts in the environment that is sensed by 2D IR. By controlling these properties of the substrate we will obtain detailed information about the kinetics of the reaction, and how they compare to IR.

**Madison McMinn and Lee Elliot**

Kinsel Research Group, Department of Chemistry and Biochemistry

*Characterization of Plasma Polymer Films through the use of Water Contact Angles*

The goal of the Kinsel Research Group is to create films, through the use of polymerization techniques and unique brush polymers, which have the capacity to change the chemical and physical surface properties of a surface. In order to achieve this goal, extensive characterization of the plasma reactor being used and the resultant films must be conducted. There are many ways in which the reactor and films may be characterized, using variables such as time, pressure, power, position, substrate, polymer, and continuous or pulsed plasma modes. In my particular study, I focused on changing the power output of the reactor as well as using continuous and pulsed plasma, while keeping the all other variables constant. A polystyrene monomer was used to create the film with glass slides serving as the substrate. The purpose of this is to begin characterizing the reactor, in order to determine which power output is optimal for specific surface properties. One of the surface properties of interest is the hydrophobicity of the film surface. Water contact angle measurements provide one method of determining hydrophobicity. Over the course of many trials, water contact angles were recorded in order to reveal trends that may develop as a function of power output. Preliminary data has revealed trends in the data that show a relationship between hydrophobicity and power. For continuous plasma, it is shown there is an initial increase in the water contact angle as the power increases, but an asymptotic value where it remains relatively constant. While the research is still ongoing for this year, the final study plans to include trends for pulsed plasma, as well as FTIR data. Future studies include varying other parameters, as well as introducing other analytical techniques such as MALDI-MS. Overall this research will lend insight into the trends of these plasma polymer films and yield the knowledge to create very specialized surfaces.

**Alyssa Meyers, Hannah Travis, and Michelle Kibby, PhD.**

Department of Psychology

*Predicting Leadership Abilities in Children Using the Self-Esteem Index*

Previous research has shown that intelligence and social skills are important components of leadership abilities (see Ensari, Riggio, & Christian, 2011). When these variables were studied in relation to gender, it was found that men who are more self-confident, extraverted, and socially skilled have an advantage in becoming a leader (Ensari et al., , 2011). This study was conducted to determine if leadership abilities were impacted by factors related to intelligence and social functioning that have not been well studied. Our participants were children between the ages of 8-12 years who were tested as part of NIH-funded projects. Both parents and teachers of the participants rated the children on measures of behavior (Behavioral Assessment System for Children), including Leadership. The children rated themselves on measures of Family Acceptance (FA), Academic Competency (AC), and Peer Popularity (PP). The measures of FA, AC, and PP were drawn from the Self-Esteem Index, which is a self-report questionnaire. Each of these predictors were considered in examining the relationship with leadership capabilities. Gender was used as a covariate as it is related to leadership abilities. Hierarchical multiple regression was used to predict Leadership ability as rated by parent or teacher; independent variables included gender, which was entered first, and then FA, AD, and PP. Gender was not related to leadership skills; however, AC significantly predicted Leadership ( $ps < .001$ ) while PP and FA did not ( $ps > .10$ ). This was true regardless of whether the rater of Leadership was a parent or teacher. Our results show that children who believe they excel academically tend to display higher leadership skills while self-perceived peer popularity and family acceptance do not appear to significantly impact leadership abilities. These results were found regardless of gender



**Mike Troll and April Strader**

Department of Physiology

*Differentially expressed genes following ileal interposition or sham surgery in diabetic rats.*

Bariatric surgery performed on overweight patients with Type II Diabetes has proven to increase insulin sensitivity and improve glucose tolerance. However, the metabolic improvement occurs prior to any measurable weight loss. To examine the weight loss independent mechanisms underlying the improved glucose metabolism following weight loss surgery we used a surgical model called "ileal interposition" in diabetic rats. In order to test this phenomena, we first injected them with streptozotocin to induce diabetes. Ileal interposition or sham surgery was then performed on diabetic rats. After being given time to recover, an oral glucose tolerance tests were performed on each rat to verify improved glucose control. We have previously shown that ileal interposition improves glucose tolerance in diabetic rats. After sacrificing the rats, we collected sections of the intestines that were rearranged during the procedure, such as the ileum. RNAseq was performed, which is a highly sensitive technique for measuring differentially expressed genes within samples. We hypothesize that interposing the ileum causes gene transcription changes not found in a non-interposed ileum, or sham-operated rats. Therefore, after looking at p-values and the percent change between tissue samples of intestinal samples, we have found that there are multiple genes differentially regulated. Many of the genes that are altered in the interposed ileum compared to the sham ileum are involved in glucose regulation, metabolism, transport and synthesis. Additionally, genes related to other aspects of metabolism were identified such as those related to bile and lipid transport. These data will be useful in elucidating the mechanisms underlying the rapid glycemic improvement following weight loss surgery and may help in the generation of weight loss or diabetic therapeutics

## **Undergraduate Research Opportunities at SIU**

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

This competitive program is open to SIU Carbondale undergraduate students in all disciplines, and offers approximately 20 grant awards each year to students working on independent research or creative activities with a faculty mentor. Awards consist of one-year grants of up to \$1,500. Students present project results at the Undergraduate Creative Activities and Research Forum held each spring semester on the SIU Carbondale campus. For more information about the program, visit [reach.siu.edu](http://reach.siu.edu), or contact staff in the Center for Undergraduate Research and Creative Activities office in the Student Services building, room 126, at 618/453-4433, or via email at [reach@siu.edu](mailto:reach@siu.edu).

### **Creative and Scholarly Saluki Rookies Program**

This competitive program offers SIU Carbondale freshmen and sophomores the opportunity to engage in faculty-mentored, hands-on research or creative activities. Students explore their intended majors, develop relationships with faculty in their field, and gain valuable research and critical thinking skills. For more information, you may contact staff at the Center for Undergraduate Research and Creative Activities office in the Student Services building, room 126, at 618/453-4433, or via email at [curca@siu.edu](mailto:curca@siu.edu).

### **McNair Scholars Program**

This federally funded program offers SIU Carbondale undergraduate students hailing from underrepresented groups, including minority and first-generation/low-income students, preparation for graduate school. It provides mentoring, GRE preparation, and academic support. McNair Scholars take part in a summer research institute and present research results at a campus symposium and at conferences in their discipline. For more information, you may visit [mcnair.siu.edu](http://mcnair.siu.edu), or contact staff in Woody Hall B139-B145, or at 618/453-4585.

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

SIU Carbondale is a member of the Illinois Louis Stokes Alliance for Minority Participation, a statewide coalition dedicated to increasing the number of underrepresented minority students in science, mathematics, and engineering. Funded by the National Science Foundation, this program provides paid, mentored research experiences for SIU Carbondale undergraduates. For more information, visit [ilsamp.siu.edu](http://ilsamp.siu.edu), or contact staff in the Center for Undergraduate Research and Creative Activities office in the Student Services building, room 126, at 618/453-4433, or via email at [curca@siu.edu](mailto:curca@siu.edu).

### **Undergraduate Assistantship program**

The Undergraduate Assistantship program provides a unique opportunity for SIU Carbondale undergraduate students. The program offers on-campus research and/or creative activity opportunities for full-time SIU Carbondale undergraduate students. Students selected for an Undergraduate Assistantship work directly with a faculty member or professional level staff member in a project that leads to a poster or oral presentation at the Undergraduate Creative Activities and Research Forum held each spring semester on the SIU Carbondale campus. Selected students spend 5, 10, 15, or 20 hours per week working on the project and are paid \$10/per hour. The UGA program, one of the programs in the Center for Undergraduate Research and Creative Activities, a unit of the Office of the Vice Chancellor for Research, has cooperating support from Human Resources, Payroll, Office of Sponsored Projects Administration, University Honors, and the University hiring departments. For more information and eligibility requirements, visit [undergraduateassistantship.siu.edu](http://undergraduateassistantship.siu.edu), or contact staff in the Center for Undergraduate Research and Creative Activities office in the Student Services building, room 126, at 618/453-4433, or via email at [ugrada@siu.edu](mailto:ugrada@siu.edu).

## SIU Carbondale Literary and Art Awards

The Center for Undergraduate Research and Creative Activities (CURCA) is one of the offices at SIUC that supports Grassroots and its events. CURCA provides Undergraduate Assistantships (UGA) for undergraduate students in Grassroots. In the 2014-2015 academic year, UGA positions were awarded for the editors. CURCA also finances the monetary award for the SIU Carbondale Literary and Art Awards.

All of the creative submissions accepted to be published in this magazine, *the Grassroots Undergraduate Literary and Arts Magazine*, are eligible for the SIU Carbondale Literary & Art Awards. Judges are chosen by the faculty advisors of Grassroots, will judge each student's work in three categories: prose, poetry, and art/photography.

CURCA is a unit of the Office of the Vice Chancellor for Research and is a unique resource for students ready to expand their education beyond the classroom. There are different programs available designed to provide students with opportunities to discover through various hands on experiences. CURCA offers students the opportunity to cooperate with a faculty mentor on independent creative activities or research.

The greatly widespread opportunities available in CURCA have produced past grant-funded undergraduate creative activities and research.

CURCA is proud to be involved in the Devil's Kitchen Literary Festival held in October of each year organized by Grassroots. The Devil's Kitchen Fall Literary Festival is an annual three-day festival featuring readings, panels, and book signings by writers from across the nation. The festival is held on the campus of Southern Illinois University Carbondale. The Devil's Kitchen awards recognize one poet, one prose writer fiction and one literary nonfiction for a collection of work, a novel, or memoir published in the preceding year.

For more information visit <http://grassroots.siu.edu/>.