

April 13-15,  
2015

# Online Abstract Book



*Exhibition of Undergraduate  
Research & Creative Achievement*

THE UNIVERSITY OF  
**TENNESSEE**  
KNOXVILLE



UNDERGRADUATE RESEARCH

# EURēCA 2015

## Online Abstract Book

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## Student Abstracts by Judging Discipline

### Agricultural Sciences and Natural Resources

Poster # 166

#### **Women in Agriculture: A Qualitative Study Examining How Women have Sustained their Leadership Roles in Australia**

*Amanda Dean*

Student's Department: Agr Leadership, Educ, Comm

Faculty Mentor: Carrie Stephens

Women are the minority in production agriculture and their leadership in agricultural industries are rarely explored. Therefore, the leadership development of five prominent agriculture leaders in Australia was chosen to be explored for this study. Connections were drawn between each case study, emphasizing the central research question of "How have women in agriculture sustained their leadership role in a male-dominated field?" Impacting their styles of leadership within farming and other agribusiness trades were the shared themes of their childhood dynamics, their individual support systems, and their current home life. This study used a constructivist paradigm, as reflecting upon the subjects' past cultural experiences were crucial in understanding their current positions in life and leadership. In-depth interviews were conducted with each participant and their objective experiences were evaluated. Further research of associated interpretations contributed to the conceptualization of the individual data. Their personal journeys were then examined, cross-referenced and compiled into an analytical study that aims to recognize successful women in agricultural leadership roles traditionally held by men.

Poster # 167

#### **Low Cost, Non-chemical Control Strategies for Small Bed Bug Infestations in Furniture**

*John Glafenhein, Jennifer Chandler*

Student's Department: Animal Science

Faculty Mentor: Karen Vail

The common bed bug (*Cimex lectularis*) has become increasingly abundant and widely dispersed throughout the U.S. The Centers for Disease Control and Prevention (CDC) and the Environmental Protection Agency (EPA) have labeled it a "pest of public health importance" because its blood feeding affects human physical, mental, and economic health. Bed bugs tend to persist among low-income residents and it is essential to find bed bug management strategies for those who cannot afford professional pest management services. We examined the sequential use of a vacuum cleaner and handheld hairdryer to remove bed bugs from furniture in a laboratory setting. Three night stands, upholstered chairs, and twin beds (mattress, box spring, and frame) were each infested with 20 male bed bugs, using one of three different strains painted blue (lab-reared strain), red or green (field strains). Bed bugs were allowed 72 hours to acclimate to the furniture before attempting recovery. We vacuumed and then applied heat with the hairdryer for 10 minutes each and then repeated these techniques intermittently for one hour in an attempt to collect all 20 males. Results of this study will help to develop guidelines on low cost management strategies for small bed bug infestations.

Poster # 168

#### **The relationship between measures of reproductive soundness, behavior, and hair testosterone concentrations during performance testing of bulls**

*Margaret Laflamme*

Student's Department: Animal Science

Faculty Mentor: Hank Kattesh

Cattle temperament strongly impacts handlers' safety, and testosterone is associated with cattle docility. Measuring hair testosterone may provide a non-invasive way to evaluate hormone concentrations. This study aimed to

analyze chronic hair testosterone concentrations as a method of assessing relationships between endocrine, production, behavioral, and reproductive traits in bulls. Bulls (n=30) were separated into 3 pens for 84 days. Hair, serum, and data were collected at 28-day intervals. Dataloggers on each bull tracked total steps taken, total lying time, number of lying bouts, and lying bout duration from d 0-28 and d 56-84. Reproductive evaluation and carcass ultrasound took place on d 85. Correlation analyses were performed in SAS 9.3. Hair testosterone positively correlated with serum testosterone on d 0 ( $r=0.50$ ,  $P<0.01$ ), 28 ( $r=0.50$ ,  $P<0.01$ ), and 56 ( $r=0.30$ ,  $P=0.12$ ). Serum testosterone positively correlated with body weight on d 0 ( $r=0.66$ ,  $P<0.0001$ ), 28 ( $r=0.59$ ,  $P<0.001$ ), and 56 ( $r=0.47$ ,  $P=0.01$ ) and with average daily gain on d 56 ( $r=0.44$ ,  $P=0.02$ ). Hair testosterone positively correlated with body weight on d 0 ( $r=0.43$ ,  $P=0.02$ ) and 28 ( $r=0.47$ ,  $P<0.01$ ). Measures of temperament exhibited a weak negative relationship with weight on all dates. These results indicate that testosterone may be a potential predictor for growth traits.

Poster # 169

### **Serological diagnosis of Parelaphostrongylus tenuis infection**

*Jessie Richards, Manasi Balachandran*

Student's Department: Animal Science-Veterinary Medc

Faculty Mentor: Stephen Kania

*Parelaphostrongylus tenuis* is a parasitic nematode common among deer, elk, moose, and horses. The parasite attacks the central nervous system, laying their eggs in meningeal tissue. Present techniques for most accurate diagnosis include necropsy to detect adult worms in the brain and spinal cord. The goal of the present research was to develop a way to accurately diagnose *P. tenuis* infection without necropsy. A gene encoding a *P.tenuis* protein was inserted into an expression plasmid and propagated in *E.coli*. The recombinant protein was affinity purified, separated on SDS-PAGE gels and transferred to nitrocellulose membrane. Western blots were utilized to identify anti-*P.tenuis* antibody present in blood serum and spinal fluid. Enzyme conjugated anti-cervid antibody produced in chickens was used to detect serologically positive elk, moose and deer.

Poster # 170

### **Monitoring Presence of Shiga Toxigenic Escherichia Coli (STEC), Salmonella and Indicator Microbes within Rainwater Catchment Systems**

*Dara Smith*

Student's Department: Biology

Faculty Mentor: Faith Critzer

Rainwater catchment systems serve to lower irrigation costs and support sustainable agricultural initiatives. Contaminated irrigation sources can be a significant source of foodborne pathogens; therefore, monitoring pathogen presence within the water source is key for determining the viability of the irrigation method. Over the course of multiple growing seasons beginning in September 2013, water samples were collected initially at a weekly and then biweekly schedule from three rainwater catchment tanks located at the Organic Crops Production Unit of the University of Tennessee Knoxville, which supply irrigation water to three respective drip-irrigation systems within high-tunnels. Coliform bacteria and generic *E. coli* populations were determined via most probable number assessment; STEC and *Salmonella* presence was also monitored by filtering representative samples and plating on selective/differential media for the target organisms. Coliform bacteria (average 2.53 log<sub>10</sub>CFU/100 ml), generic *E. coli* (average 0.65 log<sub>10</sub>CFU/100 ml), and STEC (average 0.84 log<sub>10</sub>CFU/100 ml) were detected in the rainwater catchment system, studied over the course of a year. This indicates a potential for produce contamination and mitigation strategies should be implemented with these systems. A weak correlation was also observed between STEC and both indicator organisms ( $R^2=0.51$ ,  $p<0.02$ ;  $R^2=0.44$ ;  $p<0.05$ ), demonstrating a need for routine water testing.

Poster # 171

**Retrofitting Tractors with SAE compliant ROPS using a Computer-Based Design Program***George Whitaker*

Student's Department: Biosystems Engr/Envr Science

Faculty Mentor: Paul Ayers

Tractor overturns are the leading cause of occupational fatalities on farms in the US (Myers and Hendricks, 2010). Roll-over protective structures (ROPS) have been proven effective in reducing fatalities during tractor overturn by absorbing energy from the impact of the tractor with the ground and protecting the operator zone from intrusion of outside objects and exposure to the ground plane. However, several popular tractor models do not have current ROPS designs because the designs require a balance of ROPS material strengths and allowable deflections to meet energy criteria, elasto-plastic material behavior to reduce peak moments at the mounting brackets, and ROPS positioning and alignment in order to meet appropriate operator protection. The major aim of this project is to develop and evaluate a computer-based ROPS design program that will assist in quickly developing ROPS designs based on tractor weights and dimensions. The program provides ROPS retrofit designs for tractors that were engineered to receive a ROPS, but for which ROPS designs are unavailable. The final product from the model will be ROPS design drawings with dimensions that can be used to construct a standard-compliant ROPS.

Poster # 172

**Facilitated ROPS Installation When Moving From Obstructed to Open Terrain***Mary Iannuzzi, Miles Ownby, Austin Sanders, Andrew Lynch*

Student's Department: Biosystems Engr/Soil Science

Faculty Mentor: Paul Ayers

The leading cause of death in the agriculture industry is tractor rollovers. The majority of these rollover deaths are due to a foldable Roll Over Protection System (ROPS) left in the folded, unprotecting position. Though necessary for a tractor to drive under obstructions, foldable ROPS are a burden to operate, requiring the operator to leave the tractor and lift substantial weight. Our aim is to reduce the stress on the operator to raise and lower a foldable ROPS from the seat of the tractor, in accordance with new ergonomic guidelines. The problem was first addressed by collecting measured data of the forces required to lift and lower the ROPS at any given angle, as well as forces provided by linear and gas springs at particular deflections. We then analyzed theoretical forces on the ROPS including the springs to develop a design that optimized the effect of the spring forces and greatly reduced operator strain. Prototypes were built and tested to find an optimal design. This design could have a significant impact on agricultural safety around the world. The elimination of the need to leave one's tractor to raise a folded ROPS could eliminate driver neglect and save the lives of farmers around the world.

Poster # 173

**Examining the Impact of Teacher Professional Development Models on Food Safety Knowledge, Attitudes, and Behaviors.***Cody Palmer*

Student's Department: Food Science and Technology

Faculty Mentor: Jennifer Richards

Hands On: Real World Lessons for Middle School Classrooms is a STEM education outreach program that teaches concepts of food safety. Teacher training is a critical component of the Hands On program as a means of raising teachers' knowledge in food safety and increasing their self-efficacy when delivering the curriculum. The purpose of this study was to compare the impacts of two training models on teachers' food safety knowledge, attitudes, behaviors and sustained use. A 40 item pre- and posttest was administered to all teachers trained (n=176) in each model over the past 7 years and were analyzed via independent t-test. Sustained use during the 2008-2012 academic school years was

calculated using descriptive statistics. Results indicate no significant differences in food safety knowledge ( $p=0.526$ ), attitudes ( $p=0.904$ ), behavior ( $p=0.940$ ), or composite scores ( $p=0.879$ ) from pre- and posttest in the comparison of the two models. The two-day model led to greater sustained use, but again, this difference was not statistically significant. The one-day model may be a better use of resources given to statistically insignificant gains. However, intangible benefits such as increased engagement with curriculum and transfer of instructional strategies into teachers' regular practices were not measured in this study.

Poster # 174

### **Chenopodium berlandieri: Characterization and Importance of Exhibited Antimicrobial Properties**

*Mikayla Goodman*

Student's Department: Food Technology and Science

Faculty Mentor: Kimberly Gwinn

*Chenopodium berlandieri* is a well-documented and important element of diets during the Woodland period (3,000 – 1595 B.P.), but its role is not truly understood. The objective of this research was to determine if this plant delayed food spoilage. Catfish:corn stew (reminiscent of Woodland diet) cooked with or without *C. berlandieri* was allowed to spoil; organisms less abundant in stew containing *C. berlandieri* were isolated in pure culture. Effects of sterile extracts on isolates [*Bacillus cereus* (*Bc*) and *Pseudomonas fragi/psychrophila* (*Ps*)] and two known food spoilage organisms were determined. Gram negative bacteria (*Ps* and *Escherichia coli*) were not sensitive to extract ( $P \geq 0.05$ ). Growth of a commercial *B. cereus* strain was greater at the lowest concentrations of *C. berlandieri* (7.5 mg/ml) than highest (22.5 mg/ml) ( $P=0.0233$ ). For *Bc*, interaction of extract concentration x time was significant ( $P=0.0003$ ), and high concentrations of extract increased lag phase of bacterial growth. Column chromatograph fractions were screened against *Bc*. Two fractions were antimicrobial: 1) positive for phenols (Folin-Ciocalteu); and 2) positive for phenolics and saponins (foaming and blood hemolysis tests). Since food spoilage was a pivotal problem prior to refrigeration, *C. berlandieri* may have been added to battle potentially devastating food loss due to spoilage microorganisms.

Poster # 175

### **TEMPERATURE DRIVES SUSCEPTIBILITY OF EASTERN HELLBENDER LARVAE TO RANAVIRUS**

*Carson Lillard, Reilly Jackson, Benjamin Wilson*

Student's Department: Forestry, Wildlife/Fisheries

Faculty Mentor: Mathew Gray

The eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*) of North America is declining in several watersheds, and pathogens may be playing a role. Ranavirus is a global emerging pathogen that is known to infect hellbenders; however, reports of morbidity due to this disease agent are rare. Our goal was to test the susceptibility of eastern hellbender larvae to ranavirus at two water temperatures (15 and 22 C) typical in the wild. Hellbenders were exposed to ranavirus in water at an environmental relevant concentration for three days, and their survival monitored for up to 33 days. No signs of disease or mortality were observed at 15 C. Signs of ranaviral disease (i.e., cutaneous lesions, hemorrhage) were observed after 14 days post exposure at 22 C. By the end of the experiment, only 1/3 of the exposed hellbender larvae survived. High viral loads and extensive necrosis were documented in the liver and kidney. Our results indicate that eastern hellbender larvae are susceptible to ranavirus, with pathogenicity greater at warmer water temperatures. Anthropogenic land uses that cause increases in water temperature (e.g., tree removal near streams) and atmospheric warming associated with climate change might contribute to ranavirus emergence in hellbender populations.

**Identification of high frequency conjugation factors in *Campylobacter jejuni****Devarshi Ardeshta*

Student's Department: Interdisciplinary Programs

Faculty Mentor: Jun Lin

Conjugation is an important horizontal gene transfer mechanism in bacteria. These genetic transfers might result in the observed huge diversity in *Campylobacter jejuni* strains. Meanwhile, *C. jejuni* strains display considerable variations in conjugation efficiency, ranging from  $2.2 \times 10^{-4}$  CFU/recipient cell (high efficiency) for CG8486 to  $6.3 \times 10^{-8}$  CFU/recipient cell (low efficiency) for NCTC11168. To understand the underlying molecular mechanism behind high frequency conjugation (HFC), based on the recent progress in the mechanism of natural transformation, a unique two-step screening (Co-transformation) method was designed. First, *chuB::erm* cassette was introduced in HFC strain CG8486 to bring in a co-transformation marker. And the first screening on erythromycin resistance was performed by using the genomic DNA of CG8486 *chuB::erm* mutant to naturally transform the low frequency conjugation strain NCTC11168, generating a library consisting of 2500 mutants. Any potential differentially existing genes between CG8486 and NCTC 11168 might be co-transformed with *chuB::erm* into the mutant(s) in this library, including HFC factors. Then the library was subject to the second screening for HFC phenotype. A total of nine HFC NCTC11168 derivatives were identified and confirmed by plasmid cure. Complete genome sequencing was done on six HFC derivatives and 2 low frequency derivatives using MiSeq. The subsequent comparative genomics analysis revealed a fused restriction-modification gene *Cj1051c* was responsible for HFC in *C. jejuni*. In summary, this study validate a unique co-transformation strategy to identify factors required for HFC in *C. jejuni*, established a solid foundation for us to elucidate molecular mechanisms of conjugative gene transfers in the future.

**Pollen-specific *EcoRI* expression in *Panicum virgatum*: a bioconfinement strategy***Meredith Peck*

Student's Department: Plant Sciences

Faculty Mentor: Neal Stewart

In many plants, pollen dispersal is the most important mechanism for long-distance gene flow. Gene flow between transgenic and nontransgenic plants is a concern, particularly for obligate outcrossers such as *Panicum virgatum*, switchgrass. Transgenic switchgrass varieties have shown high economic potential for biofuels. However, there is concern that intraspecific hybridization will occur with wild native populations of switchgrass. To address this concern, bioconfinement technologies can be used to limit unintended gene flow. In this study, the restriction endonuclease, *EcoRI* was targeted for synthesis in pollen. The *EcoRI* gene was placed under the control of the Zm13 maize pollen-specific promoter designed to render transgenic pollen grains nonviable. *EcoRI* is currently being tested for bioconfinement efficacy in conjunction with this study, which aims to investigate any off-target effects of *EcoRI* expression on plant growth in greenhouse conditions. Ten independent transgenic switchgrass events expressing pollen-specific *EcoRI* confirmed by PCR analysis. Preliminary analysis of transgenic events E8 and E9 were not different from non-transgenic control switchgrass with regards to tiller number per plant, height of the tallest tiller, and diameter of the tallest. Other transgenic events had off-target growth effects. Future research will analyze pollen, bioconfinement, and *EcoRI* gene expression in various plant tissues. The author would like to acknowledge the contributions of the following individuals: Morgan Peck, Reginald J. Millwood, Yi Sang, Laura Abercrombie, and C. Neal Stewart, Jr. of the University of Tennessee, Department of Plant Sciences and Wayne Parrott of the University of Georgia, Department of Crop and Soil Sciences.

## College of Architecture and Design

Poster # 12

### **Knoxville Medium-Mega Superscape**

*Daniel Allen*

Student's Department: Architecture

Faculty Mentor: Keith Kaseman

Downtown Knoxville contains, conceals and controls places of neglected human experience that are the vestige of overarching infrastructural occupation. The Knoxville Medium-Mega Superscape seeks to understand these existing fabrics in an urban center in order to declare architectural intervention and invest in a future of spatial potentials. This project is a manifesto of reanimation through human activity that operates within currently unoccupied spaces. Specifically, this project observes the potential in the literal human acts of climbing, swimming, exchanging, flying, landing and traversing to name a few. Each action brings with it a bias for architectural innovation that is discovered, challenged and in some cases redefined. Levels of potential human work within each action are graphically represented by two-dimensional analyses using light and vectors as medium. Architectural constructs react to these vector analyses and operate both at an individual nodal scale and at the scale of the city. They define space, provide armature for human action and unite in a network of increased energy.

Poster # 13

### **Cabinet of Curiosities**

*Anna Biggs*

Student's Department: Architecture

Faculty Mentor: Brian Ambroziak

Entering a museum begins a journey from present to past. The McClung Museum of Natural History and Culture on the University of Tennessee's campus aims to aid in the mission of the University; "to cultivate and enrich the human mind and spirit through teach-ing, scholarship, artistic creation, public service, and professional practice." Our task is to design an annex downtown to this hidden gem. Through explorations with overlap, rotation, and bold brushstrokes, I sought to create a bold move on the site. A simple rotation of forms creates a strong diagonal overhang that pulls you in. The horizontality of the façade guides you in. Upon entry into a high ceilinged space you enter a shop and café that can be seen from the street. The main space created is the floating double high gallery. This dark wood slatted façade punched with windows stretches across the entire site creating a bold figure in the landscape clearly seen from the surroundings. This space connects history to our city through clear views out. The building acts as a threshold from the city to a space of peaceful appreciation. In this project I create spaces that have movement and life even in their immovability.

Poster # 14

### **The Green Oak Initiative**

*Geoffrey Cavalier*

Student's Department: Architecture

Faculty Mentor: Theodore Shelton Jr

This interdisciplinary research explores the possibilities of using an underutilized byproduct of the U.S. Appalachian hardwood industry as a sustainable building material. This byproduct is the white oak "cant," which is the leftover center cut of a milled log that is typically sold "green" or un-dried because of inherent defects that limit its usefulness as a traditional dry lumber product. Currently, cants are only used in the manufacturing of shipping pallets, a low grade product. However, because cants are not kiln dried or further processed, they present a valuable opportunity as a low cost building material with a low embodied energy. Additionally, the small owner operated sawmills of Appalachia can benefit financially from value added solutions. Yet there are obstacles in the building industry that

prevent the introduction of cants into the market, such as a lack of contemporary architectural or engineering knowledge in the U.S. about green oak in building design. Therefore, this research presents results of structural testing and architectural explorations that provide fundamental information necessary for building applications. The conclusions based on these tests are being applied to a full-scale demonstration project, which will be monitored for structural and thermal performance over a period of two years.

Poster # 16

**Cabinet of Curiosities**

*William Dunn*

Student's Department: Architecture

Faculty Mentor: Brian Ambroziak

The Cabinet of Curiosities is an architectural proposal for a new McClung Museum to be located in downtown Knoxville, Tennessee. Positioned in an area of transition between Knoxville's Old and New Cities, the site is a place of hole-in-the-wall pizza parlors, atmospheric cafes, and nocturnal pubs. The three-story museum of roughly 20,000 square feet houses a café, gift shop, auditorium, classrooms, and exhibits of the McClung Collection. Nestled within the pockets of the S-shaped form of the museum, a welcoming plaza creates entry while shaded courts promote outdoor activity. After being drawn into the structure, a voluminous atrium welcomes visitors and acts as a point of origin from which to explore the museum. Skylights, windows, and other interior apertures encourage visitors to ascend the gently sloped ramp that circumscribes the atrium, which delivers them to the second and third story exhibits. In essence, the museum offers multiple scales of exploration. Just as the interior of the Cabinet of Curiosities encourages discovery of the many exhibitions, on a larger scale, the museum itself is the origin point from which visitors can explore Knoxville.

Poster # 130

**Seyfarth Shaw: A Programmatic Design**

*Geneva Frank*

Student's Department: Arch/Inter Dsgn Interdepart

Faculty Mentor: Ryann Aoukar

Dark, crowded, stuffy, and loud--these characteristics are not those of a law firm. Transparency and layers of protection ensuring privacy provide the lawyer's client with reassurance, and confidence in the lawyer. The design of the law office exemplifies transparency, the aspect of layering, and protection in all ways. A lawyer is someone who represents his or her clients in a court, or advises on legal matters. An interior designer creates an atmosphere that suits his or her client's needs in order for them to work and live harmoniously. Seyfarth-Shaw, a law office in New York City occupies three floors of the New York Times building. Understanding what a lawyer does, as well as how the staff of the firm works, and what they need, and combining all of these qualities together results in the design. Creating a space that reflects the original building shell is what is presented. Transparency, protection and layers are reflected in the design, as well as developing the floor plan based on programmatic elements. Dividing the firm's various personnel into specific areas in order for the best work flow results in the fundamental design; then adding an element of materiality and form develops the space, and makes it dimensional.

Poster # 131

**Project or Presentation Title: Market Square: A Development in Time**

*Geneva Frank*

Student's Department: Arch/Inter Dsgn Interdepart

Faculty Mentor: Liz Teston

The focus of the project is Market Square and Downtown Knoxville, site of the former Market House. The

research explores the connections between design and culture, such as how memory might affect one's experience and change future perspective. Farmers used to come into the city and sell their fresh produce. Everyone who went to the Market House or Square had a different experience because of where they came from, or how they were raised. Research included interviews with early residents who experienced Market House and the Downtown in order to determine how memories are shaped and what is retained. What was once designed in the past influences the future and can often be repeated or reinterpreted to create something new. This qualitative research shows how memory and past experience can shape the future and influence design decisions.

Poster # 132

### **Beilke Residence**

*Thomas Agee, Matthew Barnett, Meredith Graves*

Student's Department: Architecture

Faculty Mentor: Marleen Davis

Freedom by Design is focused around the notion that design can have a profound impact on a client and place. Barbara Beilke and an eastern Tennessee mobile home park allowed us to served these ideals. The home's front and back entrances were in disrepair, hindering the client from entering. Through conversation, analysis and research we determined the direction of the project was to focus around the ideas of circulation, balance, privacy, and landscape. A thin mass wall became the cohesive element to define the front and back entrance. The top of this wall provided the landscaping, which allowed the client to safely garden outside within the privacy it provides. The longitudinal nature of the site made it important for the project to remain transparent in the perpendicular direction. This allowed for minimally obstructed views to a grass field, tree grove, and the mountainous background. All of the major design considerations were be handled within the limitations and interpretations of the local traditional deck board. The adaptation of this material as flooring, façade, wall, deck, ramp, railing, storage, and board formed concrete further iterated the cohesive and aesthetic aspects.

Poster # 133

### **The Green Tech Think Tank**

*Paul Attea*

Student's Department: Architecture

Faculty Mentor: Marleen Davis

This research proposes a hub for clean energy education and photovoltaic manufacturing in downtown Knoxville. The project adopts sustainable measures throughout by the adaptive reuse of an existing building, passive heating strategies, photovoltaic energy production, rainwater collection for water closets, and rainwater runoff reduction. This project further investigates the intermixing of student, teacher, worker, professional, and client and suggests how all these roles can be included in Knoxville's quickly developing downtown. The first entity of the three major programs explored is SunTech, one of the world's largest solar panel manufactures. The second is Pellissippi State's Clean Energy Labs, a proposal for a new education division by Knoxville's largest community college. The third major program is the healthy habits level, spaces dedicated to behaviors that reduce stress in the workplace and improve wellbeing. The diverse program within this project range from corporate offices and manufacturing lines, to classrooms, labs, and cafeterias. The spatial concept of this project investigates subtractive moves that create outdoor balconies, double height spaces, and atrium spaces.

Poster # 134

**Urban Complexities \_ Tennessee River Museum + Knoxville Waterfront***Matthew Barnett*

Student's Department: Architecture

Faculty Mentor: Theodore Shelton Jr

Tennessee cities have a fundamental cultural connection to water. Each city was founded based on its location to this rich natural environment. Knoxville has consistently neglected the human connection to water ever since the foundation of the city. This research explores the ways in which the city can begin to utilize the waterfront in an iconic and cultural way. The initial design move was to remove the disfunctional James White Parkway. This would allow for the creek to re-surface and create new natural wetlands. These wetlands would cure the storm water run-off issues that plague the downtown area, and for miles up stream. Without James White Parkway the site presents a unique elevational challenge. My design proposal is to take advantage of this site context and design pedestrian surfaces that connect downtown to the east, west, and downward to the water. These pedestrian surfaces will have human interaction points, tree gardens, butterfly gardens, seating areas, and board walk space. At the highest point the project culminates with a sculptural museum about the history of Tennessee and water. This museum symbolically extends out over the water.

Poster # 135

**Maker Space: An Innovative Workshop***Kirsten Bridges*

Student's Department: Architecture

Faculty Mentor: Marleen Davis

West Jackson Avenue was once a main area for trade and commerce in Knoxville, serving as a vital artery for the movement of goods. Numerous factors have led to its decline, which leaves it seeking a new identity in order to reestablish the once thriving metropolitan area of Knoxville. The downtown area provides an environment suitable for collaboration. Through the density of metropolitan living and working, people can more easily come together to share ideas, goods, and services to enhance innovation. West Jackson Avenue's proximity to the hubs of downtown Knoxville makes it a feasible location for an innovation district in which individuals and companies, both large and small, can achieve this level of production. In order to achieve this goal, a center for entrepreneurs to pool resources needs to be established. The center, a Maker Space, will occupy a 10,000 square foot site on West Jackson Avenue and will be dedicated to increasing innovative and entrepreneurial activity by creating a collaborative environment that brings together the resources, programs, and educational opportunities necessary to develop, attract, and retain talent.

Poster # 136

**[Re]examining the Shed: A Study of Identity and Tradition in Central Appalachia***Breanna Browning*

Student's Department: Architecture

Faculty Mentor: Katherine Ambroziak

Within the context of Central Appalachia, the condition of the shed can be identified as the fundamental manifestation of enclosure, and provides for the most basic sheltering needs of human life. This building typology is prevalent in Central Appalachia, specifically Clay County, Kentucky. This project seeks to investigate the implications of [re]examining the shed through research and iterative design of an isolated rural fire station located on the campus of Red Bird Mission in Clay County, Kentucky. The material objective of this project is to provide Red Bird Volunteer Fire and Rescue with a thoughtful design proposal for a renovation of their existing fire station as well as the construction of a new annex building. The research and final design allow for a careful inspection of the condition of the shed and the

implications of inserting human occupancy into a purely utilitarian building typology. A framework of utility is transformed, pertinent to the Appalachian spirit and the fire station paradigm.

Poster # 137

### **Campus Accessibility Analysis**

*Irene Chang, Joseph Shedd, Meredith Graves, Thomas Agee, Alex Pasley*

Student's Department: Architecture

Faculty Mentor: Marleen Davis

Freedom by Design is focused around the notion that design can have a profound impact on a client and place. This client was Barbara Beilke and the place was an eastern Tennessee mobile home park. The homes front and back entrances were in disrepair, rendering the client from entering. Through initial conversation, analysis and research we determined that the project direction was to focus around the ideas of circulation, balance, privacy, and landscape. A thin mass wall became the cohesive element to define the front and back entrance. By adding landscaping the top of the wall it allowed for the client to safely garden outside with the privacy of the wall. Due to the shotgun nature of the site it was important for the project to remain transparent in the horizontal direction. This allowed for uninhabited views to grass field, tree grove, and the mountains in the background. We found that all of the major design considerations could be handled with the interpretation of the tradition deck board. We adapted this basic material to be used as flooring, façade, wall, deck, ramp, railing, storage, and board formed concrete.

Poster # 138

### **Sounds of the City: The Complete Musical Story**

*Julie Davenport*

Student's Department: Architecture

Faculty Mentor: Marleen Davis

By using a barren urban site and reworking part of the existing fabric of downtown, this project turns part of Jackson Avenue in downtown Knoxville into a vibrant music center and a concentration of creativity. Bringing all parts of the music industry to one building, this project provides a single place for musicians to gather, learn, create, and perform in order to achieve success in the music industry. This project began with the concept of revitalizing the Jackson Avenue area and extending the downtown to increase activity in this area. Much of Knoxville revolves around music, and people will be drawn towards the city to experience the vitality music brings to a space. Organized sequentially from bottom to top in the process of creating music, the design offers all needs for success in music and emphasizes its connection to the rest of the city. In order to draw public audiences and increase overall awareness of the music industry, this project also offers music lessons, performances, and dance classes to public audiences. By bringing people downtown and exposing everyone to new kinds of music, this project encourages creativity in the city and brings an energetic vibe to a previously desolate area.

Poster # 139

### **Intergenerational Living**

*Holly Harris*

Student's Department: Architecture

Faculty Mentor: John McRae

This project is the result of a multi-disciplinary studio; undergraduate and graduate architecture students, interior designers, and even nursing students contributed to the studio research. Clay County is located in the foothills of the Cumberland Mountains of the Appalachian Mountain Range. Here the land is sacred, and family is everything. Hollows are sprinkled throughout the steep valleys of the rural mountain ridges. Appalachian does not just define the region but describes a way of life that has been passed down for decades. Consequently, the nature of the project

required a high degree of empathy. The project developed from the need for emergency aid in Clay County due to geological hazards. The design is a refuge living community for displaced families. In addition to transitional housing, the project serves independent and dependent seniors and disabled citizens in the area. Intertwining the transitional housing and senior living generates a sense of community that is compatible to that found in a traditional hollow. Through the integration of a community center, a greenhouse, and a greenway/park, this project promotes education, healthy living, and connectivity among its users.

Poster # 140

### **LEAP Collaborative: A Demonstration of Sustainable Practices**

*Sierra Jensen, David Berry*

Student's Department: Architecture

Faculty Mentor: William Martella

Located on in the heart of downtown Knoxville along West Church Avenue, the LEAP Collaborative is imagined as a collection of landscape architects, engineers, architects, and planners who contract projects with an emphasis on sustainable design. Therefore, for the design of their headquarters, we wanted to express that commitment to sustainable design and display some of those practices clearly to the pedestrian and passer-by. One of the main goals was the clarity of programmatic pieces. The retail comes out to the street edge to invite shoppers. The laboratory, highly visible, pushes forward towards the street edge but is less accessible to the public by being raised up on pilotis. The multiple terraces are connected through the use of plantings that even move vertically along walls to connect plaza to upper roof terraces. The use of planting was important to bringing habitats and greenery back to an asphalt parking lot site in the middle of the city.

Poster # 141

### **Steelhead**

*Zachary Mulitauaopele, Sean Miller, Zane Espinosa*

Student's Department: Architecture

Faculty Mentor: Keith Kaseman

Steelhead is a group of architecture students that were brought together by thoughts of inventing new digital fabrication techniques and processes. The focus of this project was to rethink how waffle structures can be articulated to generate new forms. It began with an intensive modeling regime, starting with rhino and then transitioning to grasshopper. After the group went through numerous iterations, the CNC mill was used to mill the waffle form work. The outer skin was cut on a water jet cutter and was then wrapped around the intertwining waffle form. Finally the group decided to steam bend strips of white oak that were bent to weave in and out of the waffle structure to provide a organic element to a digitally heavy process.

Poster # 142

### **The Creative Circuit Catalyst Proposals**

*Armand Nasab, Jonathan Ruiz*

Student's Department: Architecture

Faculty Mentor: Marleen Davis

Gay Street and Market Square exude creative energy with lively entertainment and events such as First Friday. The energy then surges down towards West Jackson Avenue with the potential to stimulate other innovative outlets and display Knoxville's versatile talents. By revitalizing West Jackson Avenue as the Creative Circuit, the once industrious site will transform into a dynamic district promoting twenty-first century innovations. Initiating a catalyst such as Project Runway as a threshold within the district will inspire additional accenting creative opportunities such as The Sonic Stage. Project Runway embodies both an urban expansion opportunity and uniquely Knoxville identity for its fashion culture.

The project aspires to mediate a number of tasks such as integration within the existing Knoxville urban fabric while maintaining its own vitality. Furthermore, the project simultaneously fabricates its own Haute Couture experience both conceptually through the abstraction of the body as well as through the abstraction of the Haute Couture experience. The Sonic Stage serves as a platform to showcase Downtown Knoxville's musical talents through musical education, production, and performance thus creating a creative core. This musical core then amplifies the musicality of Knoxville within the Creative Circuit allowing for the creation of a Knoxville music scene.

Poster # 143

### **Red Bird Water Kiosk \_ Clean Water Clean Life**

*Garrett Nelli, Andrew Ariola*

Student's Department: Architecture

Faculty Mentor: John McRae

Architecture has the power to strengthen community bonds, support a healthy life style and enrich individual lives. The Red Bird Water Kiosk seeks to achieve all three of these on the site of the Red Bird Mission campus, located deep in the Appalachian Mountains of Clay County, Kentucky. This is an area where most live below the poverty line, and about 64 percent of water sources are contaminated. As a result, lack of clean water has forced many locals to turn to unhealthy living standards. Because of these conditions, the county ranks as one of the poorest in the nation, as well as being near the bottom in major health indicators. The Water Kiosk will provide municipal water to over 9000 local inhabitants of the area who currently do not have access to clean water. Red Bird Mission, The University of Tennessee Colleges of Architecture and Design, Engineering and Nursing are collaborating to remedy many of the health issues that are prevalent in Clay County through a three year grant from the U.S. Department of Health and Human Services. In addition to these coordinated education efforts, the Water Kiosk will be the first design - build intervention. It will also provide a new home for the local farmers' market to support local businesses and serve the social aspects of a "watering hole". This project showcases the powerful impact the students, faculty and staff of the University of Tennessee can have on our neighboring communities through collaboration of multiple disciplines.

Poster # 144

### **Stationary System with Portfolio**

*Christina Owens*

Student's Department: Architecture

Faculty Mentor: Diane Fox

This creative activity explores the possibilities of designing a stationary system. The stationary system consisted of a letterhead, envelop, resume, and business card. This process began with brainstorming about myself as an architecture student and how my style and personality can be represented through this system. The logo design is very clean, simple, and playful, which reflects my personality and the way that I design. The logo creates a push and pull with the paper itself through the voids of the letters. The use of the deep red provided the opportunity to add variety to the stationary system. As for the font family, Helvetica was chosen because it allowed the text to become an extension of the circular logo. To enhance the horizontality of the logo, the text is place to draw the eye across the page. The white space around the text aids to the balance and horizontality of the page. Yet there were obstacles in the design of the stationary system, such as placement and font choice, the results of the finished system provided a leeway to the design of my portfolio. The portfolio reflects the cleanliness and the horizontality of the stationary system.

Poster # 145

**Urban Play***Journey Roth*

Student's Department: Architecture

Faculty Mentor: Marleen Davis

Knoxville's motto "Live. Work. Play. Explore." tells a visitor everything they need to know about why one should visit or stay in the city. However, in the downtown area one piece of the phrase has been neglected; play. Urban play is a skating and rock climbing complex which will bring fun downtown. There is ample research to prove people who have an active lifestyle are healthier, work harder, and are happier. In our class project, Jackson Avenue is being transformed from an abandoned rail road site into a Creative Circuit. The street will be a place that is fostering creativity and bringing more people to downtown Knoxville. Play has been proven to have many benefits to adults. BKBS, a non-profit organization that promotes play, states, "Positive disruption of sedentary work sessions in the form of play, movement, and exercise fuels creative thought, encourages collaboration and results in a happy and healthy work environment." The close proximity to the Creative Circuit would foster creativity not only on Jackson Avenue but in the city of Knoxville. Urban Play will also serve as a place to build community. The outdoor bocce courts, rock wall, and rink provide a venue for community sports leagues. The interior meeting rooms would give the team a place to meet and practice, thus building community. Not only is play a vital part of a healthy and happy lifestyle, it is also a way to bring revenue into the city. The Knoxville Ice Bears games would bring 5,000 people to an active part of downtown several times a month. Where their current building is left unused much of the year, Urban Play would be active year round. Public ice skating times, the rock wall, birthday parties, and event spaces, would keep the building animated. An ice arena would make Jackson Avenue a destination, for games, events, and play.

Poster # 146

**East Tennessee Modern Prefabricated Housing***Jonathan Ruiz, Savannah Dixon, Christopher Allen, Caleb Brothers, Haven Bush, Jennifer Elder, Logan Higgins, Mary Leitch, Macy Mccarty, Nathaniel Midgett, Tucker Towe, Journey Roth, Kalee Holdren, Joshua Murray, Spencer Mccarty*

Student's Department: Architecture

Faculty Mentor: Hansjoerg Goeritz

The importance of the East Tennessee vernacular to a place is two-fold: identity and origin. ties closely to its origin where there is a distinct feeling and essence of home and tradition in the place by effectively harmonizing and formulating an identity and origin for Tennesseans living in the Appalachian Mountains. Understanding the vernacular significance in architecture is akin to understanding site and other contexts. Modern vernacular is not imitation but rather an integration of effective design and simplified aesthetics paired with the innovation of modern materials and structure. Applied to East Tennessee, the use of modern vernacular has been tainted. Our homes are clad in echoes of materials found in the past and we allow our buildings to sit in the shadows of the inspirational vernacular buildings surrounding us. The central Appalachian region, specifically East Tennessee, is filled with aspects of all kinds of southern vernacular architecture ranging from the historic typologies to modern interpretations of these principle home types. Looking at the East Tennessee region as a site filled with diverse density areas through the study of history, climate, and natural species, presents for a rich palette of conditions and issues facing housing development.

Poster # 147

**An Urban Oasis***Macvan Scott*

Student's Department: Architecture

Faculty Mentor: Marleen Davis

This project aims at providing a layer of green infrastructure within the West Jackson Avenue section of

Downtown Knoxville. The goal is to connect one's everyday life with this fresh layer of activity within a designed landscape, giving people a revitalizing, local getaway from the hustle and bustle of the urban sprawl. The quote by urban planner, Humphrey Carver, helps to narrate the intentions of the design: "In a garden we have indeed left the real world and entered the world of fantasy and make-believe, where nature, under the control of art, gives pleasure and rest and escape from today's worries." This concept aims to promote community and healthy living, through green infrastructure and programs that bring people of all background together. The design consists of two main elements. One, the landscaped park, and two, the restaurant and café. The programmatic layers of the park include an entertainment lawn for events, a sporting lawn, community gardens, parking for one hundred cars, a line of twenty food trucks and two basketball courts. The dining facility features a section of a small restaurant and bar that is intended for more classy nighttime events, while the café section is for more fast paced activity. These programs were chosen to provide a year round calendar of activity for the community, offering that escape from the everyday hustle and bustle and generating revenue for the city. The program influenced the design in terms of activity and overall intention and hierarchy of activity. The design is centered on the main lawns and the other programs are placed on axis with the lawns. The restaurant and café can be described as a quaint jewel at the end of the park, reminiscent of the old fashioned farm to table values.

Poster # 148

### **Beardsley Community Farm Design-Build-Evaluate Project**

*Jerry Sullivan, Kenna Cajka, Angela Claeys, Cayce Davis, Patrick Green, Jacob Heaton, Gina Raffanti, Hunter Todd, Eric Archer, Hunter Byrnes, Geneva Hill, Jared Wilkins*

Student's Department: Architecture

Faculty Mentor: Jennifer Akerman

Beardsley Community Farm is a non-profit urban farm promoting food security and sustainable agriculture through practice, education, and community outreach, located in the Mechanicsville neighborhood of Knoxville. Their mission is "to educate people of all ages about the possibilities and methods of organic and sustainable urban gardening." Students and faculty from the University of Tennessee are working throughout the 2014–15 academic year to design, build, and evaluate a new farm shelter, including a flexible classroom, administrative space for the farm staff, and restrooms. This project is understood to be more than a service building—it is expressly designed to create a real community place and to help Beardsley more effectively engage the residents of this community. Designed as a teaching tool, the shelter will educate visitors and volunteers about sustainable design principles through elegant and essential features of the building and site. This design work is the result of the creative collaboration of undergraduate architecture students working with graduate architecture students, with input from students majoring in landscape architecture and environmental studies. Through the design-build-evaluate process, our students are learning essential skills of collaboration, understanding architecture's potential to enrich community, and gaining embedded knowledge linking design and construction.

Poster # 149

### **Accidental Recycling**

*Tanya Granados*

Student's Department: Interior Design

Faculty Mentor: Liz Teston

Environmental awareness has been a growing part of society, yet many people still do not recycle. This project explores the ideas of accidental recycling. This means that people are encouraged to recycle because it is something so integrated into the experience that they don't feel discouraged. This particular space encourages people in surrounding areas that want to go out on the town to come and bring their recyclables with them. By placing the recycling bins close

to the entrance as well as implementing a rewards program, it creates a situation in which people would want to bring their recyclables and enjoy doing so. In addition, posting graphics around the location with information about recycling would also help encourage learning about recycling. Without guiltting people into feeling like they have to do something for their environment, accidental recycling provides an opportunity for people to want to do something better without making it feel like an obligation.

Poster # 150

### **Recycle\_Reflect**

*Abbey Green*

Student's Department: Interior Design

Faculty Mentor: Liz Teston

The project is to create a recycling center for the community in the downtown area of Knoxville. This will benefit all of the other local and commercial businesses, as well as, the residencies around 203 West Depot Avenue. Upon researching the area I realized that the downtown area of Knoxville is very much so an artist community. The locals have gained a vast appreciation for the artists who come to showcase their work in Market Square, which is minutes away from West depot. The Knoxville Mural Project is an organization that believes in celebrating these local artists. They have recently become an organization determined to organize and document the many murals painted in downtown. Knoxville Mural Project also wishes to create a walking tour for local people and tourists so that they will be able to explore the area, discover the murals, and meet the artists. The recycling center will be, specifically, a paint recycling center for the public, a gallery for local artists' work, and a home base for the Knoxville Mural Project. Before going on a self-guided tour to see the murals of the city, visitors and locals will learn about this organization and what they strive for. The overall concept is for visitors to see that, while the murals are a reflection of the creative city of Knoxville, painting is a reflection of themselves as individuals. Painting represents personality and part of the experience at the paint recycling center allows for visitors to see and paint murals themselves.

Poster # 151

### **Upcycle Recycle**

*Alexis Jolley*

Student's Department: Interior Design

Faculty Mentor: Liz Teston

This recycling center is located in downtown Knoxville near the Old City district on West Depot Avenue. It is adjacent to the Southern Terminal Warehouse District which houses commercial building such as White Lily and JFG which are being renovated into residential apartments. With the addition of these new residence spaces no recycling units are being placed within the buildings. This recycling center will not only serve as the primary place for these individuals to come and recycle their belongings but also a place to gather to see what is being recycled within the community. The main focus for the recycling center is the exhibition of recycled clothing which incorporates educational elements that serve to raise awareness of the amount of clothing that is thrown away each year instead of recycled. Through the use of curved walls the visitor weaves in and out of exhibition spaces and interactive spaces. This weaving pattern is related to the clothes that hang on all the surrounding walls. Each interactive space allows the visitor to encounter the time it takes to make recycled clothes and experience the weight an individual throws away each year. This recycling center serves as a donation site where visitors can come and recycle their own clothing.

Poster # 152

**Provisions for Togetherness: A Community Cafe in Downtown Knoxville***Coleen O'Leary*

Student's Department: Interior Design

Faculty Mentor: David Matthews

Historically, Knoxville has been a fragmented city, divided into very separate neighborhoods stretching to the north, east, south, and west. Certain geographical barriers, such as the river and the railroad tracks, have prevented the sub-communities within Knoxville from coming together and finding unity, but most of the separation is deeply rooted in the history of the region and the ways with which conflict has been dealt. The fragmentation of the community has caused some sub-populations and areas of the city to become forgotten and to feel isolated and powerless against the majority. The path to seeking unity and a sense of togetherness in the Knoxville community must start by breaking social barriers and creating common ground on which all community members can stand. A commonality between the neighborhoods and populations within Knoxville is the significance of food. Food is a basic provision needed to sustain life and yet the act of sharing a meal connects people in ways that allows them to feel as if they are doing much more than simply surviving. Food is a resource that all people need but not all community members have access to fresh food. The concept of a community café is to feed all people, regardless of their ability to pay for it. People can volunteer their time in exchange for a meal and prices are suggested so that patrons have the option to donate more than what is asked. The design of Provisions Community Café explores the ways in which an interior space can unify a community by drawing people in, breaking social routines, and creating an atmosphere where conversation can happen naturally and without social stigma. Provisions seeks to do much more to feed the people of Knoxville; it seeks to feed the spirit of the city and to bring people together over a meal to create a sense of community that transcends historical cynicism and social hesitations.

Poster # 153

**Programmatic Law Firm Design | Seyfarth Shaw L.L.P.***Tatum Rumsey*

Student's Department: Interior Design

Faculty Mentor: Ryann Aoukar

Presented is a project dedicated to changing the traditional atmosphere of the corporate world by keeping what works and eliminating subconscious spatial issues that may not present themselves to the common eye. This project achieved this through intensive research of the daily lives of lawyers, the architecture surrounding the design, comprehensive contextual information, and the specific company being designed for. To study the experience of the space, many trial and error three-dimensional computer models were used to simulate walkthroughs and views of the space. Diagrams examined situations existing on all levels of the scope including solar path and program. The project created a strong understanding of each activity of the diverse range of all who would experience the space, from the mail carriers to the partners of the law firm to the clientele. To design the law firm, a concept was developed based off the mission of the company Seyfarth Shaw: "Clarity from Complexity." Therefore, the mission of the space was to "Detangle the Loophole" and supply a space that creates an experience of clarity achieved as one progresses through it.

Poster # 154

**SILK: A Residence***Erin Collins*

Student's Department: Interior Design

Faculty Mentor: Ryann Aoukar

Silkworms, or *Bombyx Mori*, are a type of caterpillar that spins a fine, yet strong, filament that we use to make silk fabric. The thread serves the dual purpose of durability and pliability, making for the perfect cocoon. The silkworm

makes the cocoon it lives in by ejecting the filament through its mouth in a figure-eight fashion. These sheets of filament then layer on top of each other to build a 'womb' for the caterpillar. As it wraps the layers around and around, the silk begins to fully ENCOMPASS the caterpillar. The word encompass, therefore, is the conceptual idea for this residential design. The circular walls act to surround the studio and lounge areas of the house, which border the central garden courtyard. The sun shades that stretch and clip to the window mullions are cut with a figure eight pattern, symbolizing both the elasticity and formation of the silk filament. The two large skylights in the house also symbolize the overlapping nature of the silk filaments and emphasize how the cocoon encompasses the caterpillar. Overall, the project is a comprehensive look at how to design based on a natural system, such as SILK.

## College of Arts and Sciences

Poster # 1

### **Understanding Social Presence and Subject Position in Online Environments**

*Michael Miceli*

Student's Department: Interdisciplinary Programs

Faculty Mentor: Sebastien Dubreil

Within various fields of linguistics, language is perceived as a social mechanism, always carrying the meanings and values of community, social groups, networks, culture, identity, and more. Language is at the heart of our interaction with the world around us. In a gaming environment, this translates in discursively created actions and interactions that regulate the relationships between players and, consequently, the outcome of the game. In order to be successful in such environments, players will need to develop a strong social presence, that is to say, the ability to project themselves through their characters in the social community and present themselves as 'real people'. By examining how players successfully navigate the game space by developing effective collaborative strategies and learning how to beat the game, this study will provide better understanding of the ecology of online learning. This could in turn have three important implications: (1) better understanding of how people do develop media literacy; (2) recommend how to best use media for education; and (3) insight into how to design technology-rich environments to achieve these first two goals.

Poster # 2

### **Hadrian vs. Apollodorus of Damascus: Who built the Pantheon?**

*Weston Vawter*

Student's Department: Anthropology

Faculty Mentor: Stephen Collins-Elliott

During the reign of Hadrian, many building projects were undertaken that have been attributed to Hadrian. He has been accredited with building a great wall which expanded the Northern frontier in Britannia, which bears his name, with the rebuilding of the Parthenon, and many various monuments and buildings throughout the empire. But there is some controversy, especially with the Parthenon, whether it was Hadrian who designed these buildings or if it was a man named Apollodorus of Damascus. Using various evidences from buildings that are known to be built by Hadrian and those known to be built by Apollodorus of Damascus, this paper will look at the styles and the means in which they were constructed to compare against those buildings whose designer is questionable. By looking at manuscripts from the time as well as looking at the opinions of others, the origins of the plans of these buildings will be discerned so that a person may be able to tell whether these questionable buildings were indeed made by Hadrian or Apollodorus of Damascus. With this information being collected, this paper will hopefully be able to utilize new perspectives to answer an age old problem.

Poster # 3

**Baracksdubs: Putting Words in People's Mouths***Fadi Saleh*

Student's Department: College Scholars - Entrepreneurship

Faculty Mentor: Michael Handelsman

Baracksdubs puts words in people's mouths. Since 2012, this popular YouTube channel has entertained millions through musical mashups of President Obama's speeches. With over 850,000 subscribers and 170,000,000 views, the dubs have landed on the computer, television, and phone screens of people around the world. I credit Baracksdubs for helping me gain digital media acumen as well as entrepreneurial aptitude. As the channel's first video came out only a week after conceptualization, the video series is a testament to the ideas that rough prototypes are better than perfect products. YouTube is a great way to not only view videos but also test your ideas immediately on millions of people worldwide. Indeed, Baracksdubs represents my most strongly held value: "Don't get ready, get started."

Poster # 36

**Group Defect and Commuting Squares***Adam Laclair and Ian Francis*

Student's Department: Mathematics

Faculty Mentor: Remus Nicoara

Our project is on the defect of a group, which is a mathematical invariant that has applications to computer science, quantum mechanics, and pure and applied mathematics. Here, we define the defect, discuss the geometric significance of the group defect as the number of ways to continuously deform a commuting square, and derive some fundamental results.

Poster # 59

**The Interaction of Cytotoxins and Intermetallic Nanoparticles With Lipid Membranes***David Morse*

Student's Department: College Scholars Honors

Faculty Mentor: Dibyendu Mukherjee

Cytotoxins are agents toxic to cells. To infect, cytotoxins must overcome the cell membrane, the primary defense of the cell. Membranes, however, are highly heterogeneous, containing many distinct domains differing by lipid content. For most cytotoxins, it is unknown if individual species differentiate between lipid compositions or if some domains act as nucleation sites for aggregation. Using microfluidic techniques, we have studied the binding affinity of inert Amyloid-Beta 40 and toxic Amyloid-Beta 42, a primary suspect that exhibits neurotoxic activity leading to Alzheimer's dementia, and the membrane binding portion of the Anthrax toxin, to a variety of lipid domains. By introducing the cytotoxins to a lipid domain library we were able to examine binding propensities, both individually and aggregated, to certain lipid rafts. We find that the binding of cytotoxins to lipid domains is a selective process. Using dye encapsulation and fluorescence imaging, we have also analyzed the ability of intermetallic nanoparticles to disrupt lipid membranes through poration and penetration. Upon analyzing a library of nanoparticles varying in size, shape, and composition, we are able to quantify their relative reactivity with cell membranes.

Poster # 60

**Mature BDNF in the basolateral amygdala is critical for the consolidation of a defeat-related memory***Nathaniel Donnell, Brooke Dulka*

Student's Department: Psychology

Faculty Mentor: Matthew Cooper

The behavioral and physiological effects of social defeat require the amygdala and its interaction with the hippocampus. Increased brain-derived neurotrophic factor (BDNF) signaling in the basolateral amygdala (BLA) is necessary for the acquisition of a stress-related memory, and preventing the conversion of the precursor form of BDNF

(proBDNF) into mature BDNF (mBDNF) disrupts long-term potentiation within the hippocampus. Therefore, the objective of the present study was to determine the role of proteolytic cleavage of BDNF in the BLA during the consolidation of a defeat-related memory. Using a resident-intruder model, mice were subjected to acute social defeat stress and tissue was collected from the BLA at either one or two hours after social defeat. Western blot analysis showed that defeated mice had increased expression of mBDNF, but not proBDNF, compared to non-defeated controls. Next, male mice were implanted with bilateral cannula aimed at the BLA and received one day of acute social defeat stress. Immediately following social defeat mice received a microinjection of the plasmin inhibitor  $\alpha$ 2-antiplasmin into the BLA and were tested for social avoidance 24 hours later. Defeated mice who received  $\alpha$ 2-antiplasmin, which inhibits the conversion of proBDNF into mBDNF, showed less avoidance towards a novel conspecific compared to vehicle-treated mice. These data suggest that mBDNF in the BLA plays a critical role in the modulation of a defeat-related memory. Furthermore, this research demonstrates a novel approach to inhibit BDNF signaling in the BLA and block the consolidation of stress-related memories.

Poster # 61

### **Genetic Investigation of Separase's Role in the Viability in *Caenorhabditis elegans***

*Krishen Gosine*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Josh Bembenek

The protein separase was first associated with its role in the degradation of the protein complex cohesin, the glue that holds sister chromatids together during cell division. Defects within the gene that codes for separase can alter an organism's ability to reproduce. Some of these altered states include sterility and embryonic lethality due to failed chromosome segregation. Interestingly, in *Caenorhabditis elegans*, there is an allele of separase that still has high lethality and sterility effects even with minimal chromosome segregation failures. The objective of this study is to use genetics to shed light to how mutations affect different aspects of cell division and defects in *C. elegans*. We conducted a chemical mutagenesis screen using temperature sensitive mutant alleles of *C. elegans* separase to explore the mechanisms of other causes for embryonic death and defects. We screened the mutagenized separase F2 progeny for mutants that rescued from embryonic lethality and sterility. We are currently characterizing these mutants. Also, we have identified mutations in both separase, and protein phosphatase 5 (pph-5). Our results suggest that separase not only regulates itself, but is also regulated by other genes. We are investigating these separase mutants through genetic analysis to identify mutations within other genes that will lead to further insights of separase's role in cell division.

Poster # 62

### **Circadian Rhythmic Localization of tPA and PAI-1 in the SCN 2.2 Cell Culture May Provide Evidence for Determining the Mechanism of Gating Photic Phase Shifts**

*Grayson Hunley*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Rebecca Prosser

Mammalian circadian rhythms are controlled by a central pacemaker located in the suprachiasmatic nucleus (SCN) of the brain. The SCN exhibits endogenous rhythms in neuronal activity and entrains to external stimuli, particularly light. Light induces phase shifts in SCN neuronal activity rhythms to mediate photic entrainment. Interestingly, phase shifts only occur at night and the mechanisms gating phase shifting are not well characterized. Our lab demonstrated that the extracellular protease, tissue-type plasminogen activator (tPA) and its inhibitor, plasminogen activator inhibitor (PAI-1), help gate phase shifting. Total tPA and PAI-1 expression are rhythmic in mouse SCN. These proteins mediate different functions depending on their exact subcellular localization in the SCN; however, this remains unknown. The immortalized rat SCN2.2 cell culture exhibits rhythms in protein expression in vitro that mirror those

found in vivo and can be separated into cellular, extracellular matrix, and media fractions. Here, we investigate tPA and PAI-1 expression using western blotting in the cellular fraction of the SCN2.2 line over a 36-hr timecourse. Preliminary results suggest a rhythm in PAI-1 expression. Future studies are aimed toward elucidating the subcellular localization and temporal expression patterns of these proteins in the SCN.

Poster # 63

### **Non-degradable securin in *Caenorhabditis elegans***

*Marian LaForest*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Josh Bembenek

Cell division is an important biological process; defects in cell division can lead to cancer and infertility. Separase and securin are two proteins that are crucial to this process. We want to examine how securin regulates separase function in cell division and cortical granule exocytosis. More specifically, we want to focus on how the degradation of securin regulates separase's function in cytokinesis and cortical granule exocytosis. We hypothesized that expressing a non-degradable form of securin would inhibit both chromosome segregation and vesicle trafficking functions of separase. To address this, we have created a transgenic *Caenorhabditis elegans* line expressing non-degradable securin tagged with a fluorescent molecule. This fluorescent molecule allows us to follow securin in embryos in real-time movies. Our preliminary data suggests that in non-degradable securin lines anaphase is slower and there is embryo lethality. Non-degradable securin exhibits increased presence on chromosomes and the cell membrane and takes longer to disappear. Unexpectedly, non-degradable securin's signal persists into later development. Non-degradable securin localizes the same as wild type does, though the signal intensity varies. In the future, we will be investigating if there are any defects in cortical granule exocytosis and if cytokinesis failure occurs.

Poster # 64

### **Production, Purification, and X-Ray Crystallography of the POTRA Domains of PsToc75**

*Gabriela Little, Richard Simmerman*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Barry Bruce

Plastids arose via endosymbiosis when a cyanobacterium was engulfed by a primitive eukaryote. The cyanobacterium was enslaved by the eukaryote, eventually giving rise to a new organelle, termed the plastid. The transition from a free-living cyanobacterium to a cell-dependent organelle demonstrates how the chloroplast ancestor underwent many changes in its physiology and biological processes. The majority of the DNA belonging to the cyanobacterium was scavenged by the nucleus of the host cell. This led to higher fidelity of genetic duplication, due to the proofreading abilities of the DNA polymerase of the host cell. This left the cell with the problem of how to get the now cytosolically transcribed proteins back into the proto-plastid. Eukaryotic photosynthetic cells use the Translocon(s) of the Outer/Inner envelope of the Chloroplast (TOC/TIC) to import proteins necessary for the survival of the plastid. Although much has been uncovered about the machinery necessary for protein import, the mechanism(s) used to accomplish this import remains unclear. Each translocon comprises a pore, through which precursor proteins are translocated along with accessory proteins that assist in translocation. Toc75 forms the pore in the outer envelope of chloroplasts. Toc75 is a member of the Outer Membrane Protein of 85-kilodalton/Two Partner Secretion (OMP85/TPS) superfamily, which all share an architecture composed of a central membrane channel and cytosolic POTRA (Polypeptide Transport Associated) domains. Structures of POTRA domains from other members of OMP85/TPS have been solved, but the structure of the POTRA domains of Toc75 have not. These POTRA domains are of particular interest because Toc75 interacts with thousands of proteins, far more than other members of the OMP85/TPS. In our project, we have recombinantly expressed the N-terminal POTRA domains of Toc75 insolubly. The POTRA domains were purified via IMAC

and have been refolded. Their purity has been assessed by SDS-PAGE. Their secondary structure has been confirmed with circular dichroism, and the peptides are ready to be shipped to our collaborator Dr. Susan Buchanan. (Supported by National Science Foundation.)

Poster # 65

### **Staphylococcus pseudintermedius Efflux Pump Detection and Characterization**

*Christopher Millis*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Stephen Kania

*Staphylococcus pseudintermedius* is a bacterial organism that has become of wide concern for veterinary teaching hospitals. This is because it exhibits a high incidence of methicillin resistance and multi-drug resistance. Strains of the bacteria have been found to be resistant to erythromycin, clindamycin, trimethoprim-sulfamethoxazole, and levofloxacin. It is similar to Methicillin-resistant *Staphylococcus aureus*, commonly known as MRSA, affecting humans. It is of concern in veterinary medicine because *S. pseudintermedius* is the most common cause of pyoderma in dogs and it is associated with invasive disease in dogs and cats. The purpose of this study was to examine a group of genetically diverse isolates collected from ten different regions of the United States. They were tested using PCR for known efflux pump genes. Their ability to excrete ethidium bromide was used in a flow cytometry assay as a surrogate for antimicrobial drug extrusion. This allowed identification of isolates with efflux pumps encoded by genes not previously characterized and quantification of efflux pump activity.

Poster # 66

### **Spatiotemporal distribution of midbodies after cytokinesis in *Caenorhabditis elegans***

*Benjamin Nebenfuehr*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Josh Bembenek

The midbody is canonically described as a recycling bin for residual proteins during cell division. Recent studies have identified the midbody as more than just a compartment for gathering junk. It has been shown that many cell cycle regulators localize to the midbody and that the midbody itself will localize to regulatory sites within specified daughter cells. The Bembenek Lab is interested in the role midbodies play in regulating tissue differentiation in *Caenorhabditis elegans* development. Two unifying features of early development in all organisms are the differentiation of daughter cells in response variable gene expression and the polarization of daughter cells after division. These are both necessary for the formation of various tissues. A key cell-polarization event during the development of the intestine has been attributed to centrosome movements in the primordial gut cells after cytokinesis, followed by the localization of these cells' nuclei to the future apical surface of the lumen (Feldman and Priess 2012). Observations in the Bembenek Lab have shown midbodies to follow a similar localization pattern, albeit on the opposite side of the cell, suggesting midbodies play a role in the polarization of these future intestinal cells. Work is being done to delineate the spatiotemporal distribution of midbodies relative to centrosomes in these developing gut cells through live cell imaging of *C. elegans* embryos. The predicted role of the midbody in regulating intestinal cell polarization will serve as a precedent regarding the midbody's regulatory role during other developmental events.

Poster # 67

### **Characterization of Chemotactic Receptor Tlp2 in *Azospirillum brasilense***

*Campbell Reynolds*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Gladys Alexandre

Motile bacteria move through their environment by sensing of attractants and repellants via chemotaxis. In chemotaxis, dedicated receptors sense various environmental cues to navigate bacteria in their surroundings. *Azospirillum brasilense* is a soil bacterium known to populate the rhizosphere of cereals and chemotactic sensing of diverse compounds secreted by the roots modulates colonization abilities of these bacteria. Genetic evidence indicates that chemotactic receptor Tlp2 is a nitrate sensor and guides cells in gradients of this ion. The *tlp2* gene is preceded by a promoter with conserved binding motifs for the RpoN and NtrC transcriptional regulators, which regulate nitrogen metabolism. Experimental evidence using promoter reporter assays confirmed this hypothesis. Further biochemical characterization using recombinant protein expression and isothermal titration calorimetry identified the periplasmic binding domain of Tlp2 as directly binding nitrate. Further, site directed mutagenesis of conserved arginine residues within the Tlp2 nitrate binding domain identified residues implicated in nitrate sensing. Collectively, the results obtained demonstrate that Tlp2 is a nitrate sensor functioning in chemotaxis and provides a molecular mechanism for this function, the first of its kind identified in bacteria.

Poster # 68

### **Expression and Purification of Aminoglycoside Acetyltransferase (3)-Ib**

*Jordan Roach*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Engin Serpersu

Aminoglycosides are a class of broad-spectrum antibiotics that act as a line of defense against various types of bacteria. To evade the effects of antibiotics, bacteria have developed aminoglycoside-modifying enzymes that catalyze the covalent modification of antibiotic substrates rendering them ineffective. We seek to understand and characterize the dynamic and thermodynamic properties aminoglycoside-modifying enzymes possess in order to confer resistance to bacteria. For this study, an emphasis has been placed on the N3 acetyltransferase family as a model system. The N3 acetyltransferase-Ib (AAC(3)-Ib), an aminoglycoside-modifying enzyme, detoxifies aminoglycosides by acetylating the N3 position of gentamicin, fortimicin, and sisomicin. Previously, this enzyme was predominantly expressed in the inclusion bodies of *E. coli*. In this study, we optimally expressed AAC(3)-Ib in a soluble form by experimenting with various temperatures of incubation and concentrations of IPTG for induction. We discovered that the maximum expression of soluble and active enzyme was achieved at 14 degrees Celsius with 0.5mM IPTG. The enzyme was then purified using nickel affinity chromatography, and the purity was sufficient for further biophysical characterization. Further thermodynamic and dynamic characterization of this enzyme will allow us to investigate the role of enzyme dynamics on enzyme selectivity and substrate profile. This will provide for future comparisons with other acetyltransferase enzymes that have similar sequence homology.

Poster # 69

### **Toxicity Testing of Cellulose Nanocrystals using Bioluminescent Bioreporters**

*Kelly Arnholt*

Student's Department: Biology

Faculty Mentor: Steven Ripp

In response to increasing concerns over the exposure of humans and wildlife to toxic chemicals in the environment, several assays have been developed to detect these chemicals. One such assay is the luxCDABE-based bioreporter *Escherichia coli* 6527 in which bioluminescence is constitutively expressed and can be used to detect and monitor toxic effects of a material on living cells. The purpose of this study was to evaluate the toxicity of cellulose nanocrystals (CNCs) using this assay. The effects of CNCs were investigated over a range of concentrations, reaction times, and EC50 values. The results of the assay indicate that CNCs are not toxic in concentrations lower than 250 mg kg<sup>-1</sup> but in concentrations 300 mg kg<sup>-1</sup> through 10,000 mg kg<sup>-1</sup> the toxicity increases in proportion to the increase in the

concentration of CNCs. The bioluminescence showed the strongest signal at 0.75 h after interaction with CNCs, with an EC50 of 1518 mg kg<sup>-1</sup> after 2 h. The impact of ultrasonic dispersion on CNCs was also examined and the results indicate that dispersion increases CNC toxicity. The results of this study suggest that CNCs would not have adverse environmental impacts at low concentrations but could become hazardous at higher levels.

Poster # 70

### **Real-Time Biomonitoring of Cytotoxicity in 3D Autobioluminescent Human Tissue Culture Models**

*Haylie Lam*

Student's Department: Biology

Faculty Mentor: Steven Ripp

Current optimal imaging technologies (e.g., fluorescence and firefly luciferase-based bioluminescence) require an external stimulation be applied prior to signal generation. To overcome this limitation, a 'humanized' bacterial luciferase reporter operon (*lux*) has been developed for expression in eukaryotic organisms, resulting in human cell lines capable of self-producing bioluminescent output without external stimulation. These cells can be programmed to continuously produce an autobioluminescent signal with declining intensity correlating with exposure to toxicants detrimental to cellular health or to auto-initiate bioluminescent production only in response to the detection of specific target agents. To evaluate the bioluminescent response to toxic compounds, constitutive autobioluminescent human embryonic kidney (HEK293) cells were either encapsulated in collagen hydrogel or seeded as a monolayer in 96-well plates, and exposed to the antibiotic Zeocin. Significant decreases in bioluminescence were observed after 48 hours of treatment with 1000 µg/ml and 400 µg/ml Zeocin concentrations in 3D and 2D conditions, respectively. HEK293 cells expressing the *lux* system under the regulation of the Tet-On inducible promoter responded to doxycycline stimulation similarly under both 3D and 2D growth conditions, with cells grown under 2D conditions producing a higher fold increase in bioluminescence induction compared to those grown in 3D conditions, suggesting that 3D-grown cells are more resistant to toxicants than cells grown in 2D. The results demonstrated the utility of a reagent-free autobioluminescent cellular system for continuous, real-time toxicity monitoring in 3D tissue culture models.

Poster # 71

### **Development and Implementation of Cycloolefinic CO<sub>2</sub> Thin-Film Gas Separation Membranes**

*Matthew Cameron*

Student's Department: Chemistry

Faculty Mentor: Brian Long

According to a report published by the Environmental Protection Agency (EPA) in 2011, approximately 6,702,000,000 metric tons of carbon dioxide (CO<sub>2</sub>) were released into Earth's atmosphere as a result of fossil fuel combustion for electrical energy generation, transportation, etc. In response to these alarming statistics, they developed a nationwide incentive known as the Clean Power Plan – Proposed rule in June of 2014. This nationwide incentive calls for a 30% reduction in all CO<sub>2</sub> emissions nationwide by the year 2030. In order to provide a secure and sustainable environment for future generations to come, we must learn how to decrease these greenhouse gas emissions and their detrimental effects. A logical method to reduce those emissions is the utilization of CO<sub>2</sub> separation membranes. In order to achieve effective CO<sub>2</sub> gas separation in an industrial setting, a cost-efficient method needs to be employed. There exists several forms of gas separation that include cryogenic distillation, pressure swing adsorption, vacuum swing adsorption, and temperature swing adsorption. These existing methods require significant energy inputs that are usually related to a phase change in the target gas. In order to be cost-efficient in an industrial setting, a more passive approach is ideal. Our aim is to produce thin-film polymer membranes with imbedded CO<sub>2</sub>-philicity that will passively select for CO<sub>2</sub> molecules over the other gas molecules in flue gas.

**Synthesis and Characterization of Ln[Hdpm]<sub>x</sub> Compounds***Ashlyn Jones*

Student's Department: Chemistry

Faculty Mentor: Howard Hall

In order to thoroughly perform radiochemical analysis, solution phase separations are a necessary and conventional process. However, the traditional methods are often slow and tedious processes, hence the need for more rapid separation techniques. This work involves the exploitation of gas-phase chemistry for the isolation of fission and activation products in the immediate aftermath of a nuclear explosion. In this work, the synthesis and gas thermochromatographic separations of rare earth element (REEs) will be presented. The metals form complexes with 2,2,6,6-tetramethyl-3,5-heptanedione (Hdpm) at volatilized temperatures between 175-250 degrees C. The characterization of these products with Fourier Transform Infrared Spectroscopy (FT-IR), Powder X-Ray Diffraction (PXRD), Inductively Coupled Plasma Time-of-Flight Mass Spectrometry (ICP-TOF-MS), and melting point analysis will be discussed. In this work, the experimental separations as well as determination of key thermodynamic parameters that control these systems have been explored and offers the advantage of rapid, carrier free separations, in addition to providing elemental and isotopic composition information regarding a given sample. Furthermore, this work also supports the growing need for rapid separation and analysis of short lived isotopes currently being used in the radiopharmaceutical and nuclear medicine community and the super heavy element discovery research efforts.

**Synthesis and Characterization of Thermoplastic Elastomers with Tunable Upper Service Temperatures Based on Polybenzofulvene***Benjamin White*

Student's Department: Chemistry

Faculty Mentor: Jimmy Mays

Styrenic thermoplastic elastomers are very important in both academic research and industrial applications. This work represents the first synthesis and characterization of thermoplastic elastomers based on polybenzofulvene (PBF) and polyisoprene (PI) as a method of improving the upper service temperature. PBF-b-PI-b-PBF triblock copolymers (FIF) were synthesized using a difunctional lithium-based initiator (1,3-phenylene)-bis-(3-methyl-1-phenylpentylidene), with lithium sec-butoxide as a polar additive in benzene (Figure 1A). The molecular weight and polydispersity of the resulting polymers were determined by GPC and LS, chemical composition by NMR, micro-phase separation by TEM, and thermal properties by DSC and TGA. Dynamic mechanical analysis (DMA) was used to measure the mechanical strength of the polymers. The synthesized FIF triblock copolymer retained its storage modulus up to 150° C before dropping off (Figure 1b). DMA also showed that FIF has a tensile strength of 2.8 MPa at 500% strain. FIF triblock copolymers were synthesized containing various polar additives and the T<sub>g</sub> was measured as a function of Mn. It was found that the T<sub>g</sub> could be adjusted significantly (from 152.2 °C to 198.7 °C) by using DME as a polar additive.

**The Polymerization of Lactide: A Variation of Activity in Group 4 Redox Active Catalysts***Kaitlyn Wray*

Student's Department: Chemistry

Faculty Mentor: Brian Long

Poly lactides are polyesters that are derived from renewable agricultural resources, and they have been studied at length for their use in decomposable packaging materials, raw materials for 3D printers, and biomedical applications. Not only do poly lactides have a diverse range of applications, but they are advantageous due to its monomer's ability to consume carbon dioxide, to be biocompatible and numerous other reasons. Previous studies have shown that the

polymerization behavior of lactides can be controlled through the use of single-site redox-switchable catalysts. In these studies, the titanium catalyst contained a salen ligand comprised of two ferrocenyl moieties positioned far from the metal center. However, in this study, a single-site titanium catalyst containing a salphen ligand, containing a ferrocenyl moiety much closer to the active metal center, was synthesized. The salphen catalyst demonstrated that the rate of propagation can be influenced by the proximity of the redox-active ferrocenyl moiety to the active metal center. Research into the titanium salphen catalyst was continued to determine the difference in the rate of polymerization for the oxidized and reduced versions of the catalyst. We found that the oxidized form of the titanium salphen catalyst polymerized at a higher rate than the reduced form, showing the opposite trend compared to the titanium salen catalyst.

Poster # 91

### **Swallow Imagery in the Spring Fresco**

*Chloe Lovelace*

Student's Department: Classics

Faculty Mentor: Aleydis Van de Moortel

The Spring Fresco, or the Room of the Lilies, from the Delta Complex at the Late Bronze Age site of Akrotiri, on the Aegean island of Thera, is considered to be the first painting of a nature scene in European art history. With this has come significant analysis of the fresco, which covers three walls of the small room. There has been much discussion regarding the room's purpose and the iconographic meaning of the images in the fresco, especially in regards to the flying swallows. Initially thought to be birds in courtship, the birds are now thought to be engaging in behavior that is much more substantive. Present scholarly opinion is divided about whether they display parental or combative behavior. However, neither of these explanations fully accounts for all the bird behavior depicted in this room or for the birds' relationship to the other components of the painting: the lilies and the multi-colored rocks. Moreover, neither interpretation accords well with the purported cultic function of the room. This paper seeks to offer an alternative explanation of the birds as a representation of the cycle of life. This interpretation also applies to the rest of the imagery of the room and provides a better fit for cultic context, thus providing a deeper and more holistic understanding of the entire assemblage.

Poster # 92

### **Lost in the Sands of Time: The Monumental Imperial Latin Inscription at 'Ayn Gharandal**

*Emma Pugmire*

Student's Department: Classics

Faculty Mentor: Erin Darby

The 'Ayn Gharandal Archaeological Project has been excavating an ancient Roman military fort in southern Jordan since 2010. During the 2013 season one of the primary research objectives for the excavation of the fort's gate was to identify when the fort was built and in what historical context. In addition to other data, our excavation of the fort's gate produced a monumental Latin foundation that confirmed the foundation date and clarified the role of 'Ayn Gharandal within the Roman empire. Because the inscription was left undisturbed in archaeological context for hundreds of years, it has shed great light on the date and context of the fort. Written on the inscription stone were the names of the Roman tetrarchy under Diocletian. Thus, we know now that this fort was built as part of Diocletian's policies to strengthen the Roman limes, or borders, and it provides an absolute date for the construction of the fort, a rare discovery in archaeology. This poster will first, explain the careful excavation of this monumental find, and second, what the inscription now helps us understand about the larger imperial objectives of the tetrarchy on the Roman frontiers, particularly in the eastern provinces, as an attempt to rebuild the Roman Empire after the crisis of the Third Century.

Poster # 93

**Gendered Patterns of Economic Marginalization and Women's Political Participation in Latin America***Alina Clay*

Student's Department: College Scholars Honors

Faculty Mentor: Jana Morgan

Although women in Latin America have recently made impressive advancements in political representation by achieving high-ranking political positions, embedded economic inequalities persist and significantly hinder their political participation in activities such as voting and actively supporting political parties. Furthermore, widespread policy mechanisms are not set up and effective in fully engaging women in politics. Political and economic oppression of women in this region have historical roots and thus are deeply entrenched within society. Our research question explores how gendered patterns of economic marginalization affect the political participation and attitudes of women in Latin America. To answer this question, we have analyzed cross-national data on gender inequality in incomes, based on compiled household income surveys in Latin America. We have also analyzed indicators of Between-Sex Inequality (BSI) that illustrate the extent to which income has disproportionately advantaged men over women in Latin America and how these income patterns have evolved over time between men and women. The data suggest that gender inequality across Latin America has gradually decreased over the past three decades and that overtime variation within countries is larger than cross-national variation. Additionally, we have found that gendered patterns of economic marginalization significantly diminish women's political participation, which contributes to their political and social marginalization.

Poster # 94

**When Pigs Flu***Dhara Naik, Brooke Pearson*

Student's Department: Geography

Faculty Mentor: Ronald Foresta

With the globalization of the world's economy in the last several decades, international travel has increased enormously. As it has, so has the potential for the rapid spread of diseases. The 2009 swine flu (H1N1) epidemic is a testament to our more hazardous globalized world. H1N1, a deadly mutation of the more common swine-flu virus, began in Mexico and within a few months had become a global epidemic that eventually killed many people. The World Health Organization (WHO) reported 18,449 people with laboratory confirmed results that had become victims of this virus, but data suggests that this number may have been grossly underestimated because many cases went unreported. We wanted to see if the spread of the disease and its impact on different countries could be explained by the volume of travel from infected countries or if there were other identifiable factors involved? Our research suggests that while the paths and volumes of international travel were important in explaining the profile of the epidemic, the proactive health measures taken by certain countries was also significant in explaining the spread and impact of this flu strain.

Poster # 95

**The Synergy of Disney Animated Films and Attractions: An Applied Film Analysis***Tyrel Prentiss*

Student's Department: College Scholars Honors

Faculty Mentor: Charles Maland

Though the word "Disney" now refers to a world-wide multi-media empire, it all began with animation. After finding success with his movie studio, Walt wanted a new challenge. He envisioned creating a new type of amusement park where, "the parents and the children could have fun together." That vision was realized in 1955 with the opening of Disneyland. From its inception, the attractions at Disneyland were based upon Disney films. Walt believed that the elements crucial to the success of his movies would translate into magical attraction experiences for Guests. This paper will explore the synergy between select Disney animated movies and the attractions they inspire utilizing an applied film

analysis. It will examine rides at Disneyland in California and at the Magic Kingdom at Walt Disney World in Florida. It will analyze the storytelling style of a select number of the original attractions created by Mr. Disney and a few of the newest attractions created under the current leadership of Mr. Lasseter. This paper will apply a formalist analysis to the study of that synergy utilizing elements of film form and cinematic style. These will be compared and contrasted while also analyzing changing contextual factors including aesthetics and technology.

Poster # 96

### **The Threat of Gender Nonconformity to Christian Authorities in Antiquity**

*Robert Cremins*

Student's Department: Religious Studies

Faculty Mentor: Christine Shepardson

In early Christianity, the perception of morality functioned as social capital. So, to an extent, demonstrating morality upheld power. The performance of one's gender became a way of revealing morality. Through the construction or manipulation of gender, one could exert control and influence over others ideologically. The late antique *Life of Pelagia* provides an excellent example of a person whose gender was manipulated in order to uphold an ideology that Christian authorities worked to construct. Through dictating the correct performance gender, male leaders, such as the earlier second-century Clement of Alexandria, constructed gender in a way that supported their own morality, and thereby power. Those who disrupted the gender ideology threatened the cosmology that helped to uphold and construct male Christian power. Therefore, some Christian leaders, such as Clement of Alexandria, John Chrysostom, Athanasius, and other powerful rhetors, constructed and upheld the demonized category of the effeminate in order to preserve and expand their power. Placing gender nonconforming men and women into categories that promoted their ideology functioned as a tool by which the power of male Christian authorities could be perpetuated. Gender nonconforming men were categorized as effeminates and holy women became men.

Poster # 97

### **Microbial Community Structure and Abundance in Uranium and Nitrate Contaminated Groundwater**

*Brittney Detienne*

Student's Department: Earth/Planetary Sciences

Faculty Mentor: Terry Hazen

Based on geochemical and geographical differences between groundwater wells, the distribution and abundance of microbial communities in each well could vary drastically. At the Department of Energy's Oak Ridge field site, 243-acres of contaminated area exist. Contaminants in this site include nitrate and uranium with concentrations ranging from  $<0.05$  -14400ppm and  $<0.005$  - 55ppm, respectively. In order to understand relationship of microbial communities to different concentrations of uranium, groundwater wells were sampled for geochemical and microbial analyses. The goal of this study is to characterize microbial community structure and diversity of uranium and nitrate contaminated wells versus non-contaminated wells. Microbial diversity and biomass were determined using phospholipid fatty acid (PLFA). To measure PLFAs, groundwater was filtered through 0.2  $\mu\text{m}$  pore size Sterivex filter, immediately frozen, and stored at  $-80^{\circ}\text{C}$ . Lipids were extracted using the modified Bligh-Dyer method. Currently, PLFA results are being analyzed. However, preliminary PLFA data indicates community diversity in uranium contaminated wells have greater microbial diversity compared to non-contaminated wells. Additionally stress indicators for Gram-negative bacteria were identified in a small fraction of the wells. Results from this study indicate that groundwater microbial communities can vary in respect to the geochemistry and environmental stress factors at the site.

Poster # 98

**Asherah in Israelite Religion***Taylor Thomas*

Student's Department: Religious Studies

Faculty Mentor: Erin Darby

In the early days of Israelite religion, cultic practices and icon worship were common. One example of such practice involves the term asherah. In the Ancient Near East, asherah referred to a sacred object crafted from wood that was located near places of religious gathering. It is also possible that the term asherah is a reference to the ancient goddess Astarte worshipped by Ugaritic cultures. A third possibility, evidenced by the tendency of cultures of the ancient Near East to have little to no separation between deities and their physical representations and the non-static nature of religion, is that the asherim existed originally as a means to invoke the goddess Asherah, facilitating her role in ancient society. Over time, the line between deity and cultic object would have become more defined, simultaneously creating literary confusion for ancient sources such as the Deuteronomist. Whether an entity or an object, asherah was eventually purged from Israelite society. Evidence of attempts to do so lie in the reforms of King Josiah laid out in the second book of Kings. This presentation will explore the possibilities of the nature of asherim through the analysis of ancient texts and the language within used to describe the asherim and their function in Israelite society. It will synthesize the arguments for common perception of asherah and describe the role of the deity and/or relic in non-Israelite cultures of the Ancient Near East. Beyond literary description and analysis, this presentation will focus on material culture remains to describe the actual presence of asherim in Ancient Israelite cultural practice, drawing on data gathered from the excavations of Kuntillet 'ajrud and Khirbet el-Qom.

Poster # 99

**Petrographic and microstructural analysis of lower crustal rocks in Southern Tibet.***Michael Smith*

Student's Department: Earth/Planetary Sciences

Faculty Mentor: Micah Jessup

Lhagoi Kangri gneiss dome is one of the North Himalayan gneiss domes (NHGD), located in the southern Tibetan Plateau, between the South Tibetan Detachment System and the Indus-Tsangpo suture zone. The NHGD are characterized by Tethyan metasedimentary rocks structurally overlying a core of granitic gneiss exhumed from crustal depths of over 20 km. Rock samples proximal to the core-cover contact were collected from along a central valley in Lhagoi Kangri dome. At these lower structural levels the NHGD typically exhibit features associated with exhumation. Petrographic and microstructural analyses of the samples were conducted in order to quantify the kinematics and temperature of deformation related to doming and exhumation. Sample analyses included documenting quartz microstructures, shear sense indicators, and metamorphic mineral assemblages. In all samples from this transect, quartz grains have amoeboidal to interlobate grain boundaries characteristic of high temperature grain boundary migration, which typically occurs between 500-650 °C. Samples below the core-cover contact also contain quartz with chessboard extinction that indicates temperatures above 650 °C. These deformation temperatures are similar to the metamorphic temperatures implied by the presence of minerals such as kyanite and sillimanite. Shear bands and shear-sense indicators in the samples indicate a mixed top-SW and -NE sense of shear.

Poster # 100

**Studying the Source and Deposition Mechanisms of Hydrated Sulfate Minerals at Valles Marineris, Mars Using a Terrestrial Analog***Patrick Smith*

Student's Department: Earth/Planetary Sciences

Faculty Mentor: Anna Szykiewicz

Spectrally detected hydrated sulfate minerals in the Valles Marineris region of Mars indicate that there was once an active hydrologic cycle; however, the formation mechanisms of these minerals on Mars are not yet well understood.

Photographic evidence suggests that sulfate minerals might have formed on the Martian surface in a similar way to sulfate efflorescences forming in dry environments on Earth. Typical mechanisms for deposition of terrestrial sulfate efflorescences are: evaporitic deposition through oxidation of sulfide minerals such as pyrite ( $\text{FeS}_2$ ) and dissolution of primary sulfate minerals such as gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) and anhydrite ( $\text{CaSO}_4$ ). In this project, I attempt to study the origin of sulfate minerals in Valles Marineris (Mars) by studying formation mechanisms of terrestrial sulfate efflorescences in the Rio Puerco Watershed, New Mexico. Using orbital visible and spectral images from Mars and mineralogical and sulfur isotope compositions of sulfate efflorescences from the Rio Puerco watershed, I endeavor to determine the depositional history of hydrated sulfate minerals on Mars. These data will be further used to explain past water activity in Valles Marineris. I also intend to compare quantitative chemical and mineralogical measurements to spectroscopic analysis of the same mineral samples performed at Purdue University.

Poster # 101

### **Plasticity in a changing world: phenotypic variability in *Boechera stricta* across spatial and temporal gradients**

*Sarah Daws*

Student's Department: Ecology/Evolutionary Biology

Faculty Mentor: Jennifer Schweitzer

While some plants are mobile and able to physically distribute to more suitable environments, other plants have limited dispersal ability and must find alternate ways to adjust to changing conditions in situ through adaptation or plasticity. Predicted changes in abiotic pressures, including drought stress and warmer temperatures, may influence the phenotypic expression of traits in plant populations through these mechanisms. In this study, we used a reciprocal transplant approach to investigate the temporal and spatial patterns of plasticity in a native perennial mustard, *Boechera stricta*, in the Rocky Mountains. Specifically, we explore how a temporal gradient that reflects drought stress over three growing seasons affects plasticity in a suite of functional traits. Additionally, we investigate plasticity between genotypes of *B. stricta* over micro- and macro-environmental scales. By tracking foliar and phenological traits over three years, we found equivalent plasticity within and between sites, suggesting that *B. stricta* can respond to environment at small spatial scales. Additionally, plasticity was consistent with drought stress as plants exhibited enhanced water use efficiency in dry years. We demonstrate that plasticity occurs at small spatial and temporal scales, and our results suggest that plasticity may allow plants and other organisms to phenotypically keep pace with climate change by enhancing immediate survival. This project was conducted as part of the research of Jill Anderson of the University of Georgia. Thanks to Dr. Anderson, her lab, and her collaborators for the establishment and maintenance of the experimental gardens, laboratory processing, and support through the project.

Poster # 102

### **Foraging behavior of Carolina Chickadees (*Poecile carolinensis*) and Tufted Titmice (*Baeolophus bicolor*) in response to the body orientation of snake predator models**

*William Johnson*

Student's Department: Ecology/Evolutionary Biology

Faculty Mentor: Todd Freeberg

Animals have evolved to reduce risk of predation by recognizing the threatening cues of potential predators. One such cue is the face and body orientation of the predator. However, an animal's ability to detect the head may be more difficult when the predator's body is serpentine (thus having little distinguishing factors between the head and tail.) This study explored the ability of Tufted Titmice (*Baeolophus bicolor*) and Carolina Chickadees (*Poecile carolinensis*) to distinguish the body orientation of predator snakes. A balanced, repeated measures design was used such that each bird flock was exposed to a snake model where the head was facing the feeder or the tail was facing the feeder during different sessions. Bird species, latency of the first bird to take seed, and the number of visitations by birds to the feeder were recorded during each session. The results showed that significantly fewer visitations took place

when the head of the snake model faced the feeder compared to when the tail faced the feeder. Therefore head and body orientation may be an important factor that animals use to assess predation risk even when those orientation cues are hard to discriminate, such as with serpentine predators.

Poster # 103

### **Do Unaccounted for Mutualist Interactions Explain Plant-Soil Linkages?**

*Peter Meidl*

Student's Department: Ecology/Evolutionary Biology

Faculty Mentor: Jennifer Schweitzer

Pollinators are in decline and little is known about how reductions in pollination and subsequent allocation of carbon to setting seed, alters plant traits and soil processes. Despite the multitude of studies examining plant-pollinator interactions, none have addressed the role of pollination on plant-soil linkages and feedbacks, specifically nutrient flux in above/belowground processes. In a two year field-based manipulative experiment where pollination was manipulated, we hypothesized that: i) without successful pollination, plant allocation patterns of integral nutrients such as carbon and nitrogen will differ when compared to genetic plant clones that have been pollinated. ii) in the absence of pollination, plants will invest more carbon to belowground processes (root systems/exudates). iii) shifts in allocation of nutrients within plants will alter rates of herbivory by other insects, thus altering community composition. Consistent with our hypothesis, we found measures of specific leaf area (SLA) of the leaves from the pollinated treatment to be significantly higher than the non-pollinated treatment. Herbivore damage was also found to be significantly different across treatments, with higher rates present in the pollinated treatment. Both results to date point to increased levels of nutrients in aboveground tissue in pollinated plants, and likely a shift of nutrients to belowground avenues for the non-pollinated treatment. This study provides a novel example of previously unknown consequences of pollinator loss to plant traits and community dynamics. The results suggest that nutrient allocation is shifted to various regions of a plant's sphere of influence, while also expanding knowledge regarding the influence of pollination on ecosystem level processes.

Poster # 104

### **THE MORPHOLOGY OF THE UNUSUAL FUSED COLUMNAL COMPLEX IN THE STEM OF BROCKOCYSTIS**

*Erica Allen*

Student's Department: Geological Sciences

Faculty Mentor: Colin Sumrall

The stems of glyptocystitoid rhombiferans are conservative throughout their history from the Middle Cambrian to the Late Devonian. In nearly all species the stem is divided into a proximal and distal portion with a gradational transition. Proximally, the stem is heteromorphic with inner and outer columnals that taper distally. The distal portion of the stem is homeomorphic with barrel-shaped columnals, and in most groups the stem is not affixed to the substrate by a holdfast. In Brockocystis, the transition between proximal to distal stem is abrupt and marked by a large, conical, fused element that is unknown in other glyptocystitoid taxa. A large number of these Brockocystis fused columnal complexes were collected from the Middle Silurian Brassfield Formation of central Kentucky. These conical columnal complexes show a great deal of variation in external morphology, ranging from short and wide to tall and narrow. A principle component analysis shows that all of the shape variance of these elements is drawn from a single morphological population, rather than representing different species. In all cases the proximal end is wider with a sunken facet where the distal end of the proximal stem articulates. The distal end bears a small facet for articulation of the distal stem. The lumen is somewhat narrow and tapers distally. Details of the internal morphology were studied in thin sections cut parallel to the axis of the element through the lumen. These thin sections show that the fused columnal complexes are formed from inner and outer columnals arranged similarly to the proximal stem. The inner columnals are thin and of

uniform thickness throughout the element and are confined to the edge of the lumen. In most specimens, the distal few outer columnals bear greatly thickened flanges that wrap around the more proximally positioned inner and outer columnal pairs, suggesting that columnals are incorporated into the structure proximally. In one of the sections, flanges from all of the outer columnals were fused into the structure. It is unclear what the function of the fused element is, but it may relate to isolating the proximal and distal portion of the stem.

Poster # 105

### **Optimizing the EC50 Concentration of An Estrogen Bioreporter *Saccharomyces cerevisiae* BLYES-2G**

*Piper Black, Jacob Delalla*

Student's Department: Microbiology

Faculty Mentor: Steven Ripp

*Saccharomyces cerevisiae* BLYES-2G is a bioluminescent yeast bioreporter for use in chemical sensing and environmental assessment of estrogen disruptor activity. Traditionally, BLYES-2G is cultured in modified minimal media (YMM). However, YMM is difficult to make because it requires many additive solutions. Yeast synthetic dropout media (YSD) is a more convenient alternative to YMM. Yet, assays performed with this media have an undesirable increased half maximal effective concentration (EC50) value of  $1.59 \times 10^{-8}$  M, when compared to assays performed with the same strain cultured in YMM (EC50 =  $3.67 \times 10^{-10}$  M). In order to identify key factors contributing to the lower EC50 values in YMM, a comparison between the two types of medium revealed that two major differences were their pH values and copper concentrations. YMM has a neutral pH at 7.0 whereas YSD was more acid with a pH of 5.3. To determine if the medium pH was a critical component for EC50 concentrations, BLYES-2G was tested in YSD medium adjusted to a range of pH values (5.3 to 8). It was found that medium pH did not affect EC50 values significantly. Additionally, YMM has a higher Cu<sup>2+</sup> concentration (150  $\mu$ M) than YSD (0.25  $\mu$ M). Increasing the Cu<sup>2+</sup> concentration from 0.6  $\mu$ M to 150  $\mu$ M resulted in the decrease of EC50 value from  $1.17 \times 10^{-8}$  M to  $2.77 \times 10^{-9}$  M. These results suggest that Cu<sup>2+</sup> concentration plays a major role in the sensitivity of the bioluminescent response in the estrogen bioreporter BLYES-2G.

Poster # 106

### **Isolation and Characterization of Anaerobic Microbial Communities from Hydraulic Fracturing Fluids**

*Sheridan Brewer*

Student's Department: Microbiology

Faculty Mentor: Terry Hazen

Hydrocarbon production from hydraulic fracturing of gas shale in the US has skyrocketed recently and is projected to keep growing. With the increase of this unconventional drilling method, concerns have been proposed about environmental safety and dangers to human health. This method involves injecting water-based fluid between 1-3 km deep into the Earth and the fluid produced from the well after drilling is often reused in other hydraulic fracturing operations. The goal of this study is to identify novel organisms that might have bioremediation capabilities for the toxic flowback water and compare microbial communities isolated from fracking water samples in anaerobic conditions. Water samples from Pennsylvania include six different collections of produced (flowback) water, a flowback mix tank, and three different treatment tanks. Inoculations from the water samples were grown under anaerobic conditions in high salinity marine media and halotolerant hydrocarbon degradation dependent media. DNA was extracted, and 16S rRNA gene sequences were used to identify the isolated microbes, and the microbial communities were characterized by 16S rRNA gene amplicon Illumina sequencing. The physiological conditions of some significant isolated microbes were further characterized by the Omnilog phenotypic microarray system. Early results show presence of numerous anaerobic microbes including sulfate reducers.

Poster # 107

**Metabolite Usage in *Candida albicans* Mutant Strains***Justin Dinsmore*

Student's Department: Microbiology

Faculty Mentor: Todd Reynolds

*Candida albicans* is the most common cause of systemic fungal infections in immunocompromised patients. Understanding its virulence mechanisms may provide insight to new drug targets. Nutrient acquisition is an important aspect of virulence. Choline is a small molecule in human serum that is crucial to the formation of phosphatidylcholine (PC), a key component of the membrane. The ability of the fungus to make PC depends on two different pathways. This project focuses on how the fungus is able to take small molecules present in serum like choline or glycerophosphocholine (GroPCho) and assimilate them into PC using enzymes from the Kennedy pathway. The genes PEM1 and PEM2 are required for converting the membrane lipid phosphatidylethanolamine (PE) to PC. A *pem1Δ/Δ pem2Δ/Δ* mutant cannot make PC from PE. However, this mutant remains pathogenic in animal models. We have conducted tests with the mutant to determine if *C. albicans* produces PC from choline or GroPCho. Supplementation of the *pem1Δ/Δ pem2Δ/Δ* mutant with the aforementioned metabolites produced growth at or near wild type levels, indicating usage in the host. We are making mutants in the Kennedy pathway to explore if this affects virulence in the host.

Poster # 108

**Diversity and Distribution of Archaeal *amoA* Genes in Geochemically Distinct Marine Basins***Kathleen Fitzgerald*

Student's Department: Microbiology

Faculty Mentor: Terry Hazen

Microbes are essential in the cycling of nutrients within the environment. Since the discovery of ammonia-oxidizing archaea (AOA), it is now understood that Thaumarchaeota may play an important role in the nitrogen cycle within marine environments. AOA are mainly responsible for the first step in the nitrogen cycle, which is oxidation of ammonia to nitrite. In this study, we aimed to understand the diversity and distribution of the archaeal *amoA* gene, which is required for ammonia oxidation. We used high-throughput next-generation sequencing to investigate *amoA* diversity in 59 samples taken from three marine basins at varying depths. Our preliminary data suggest that diversity of archaeal *amoA* is low and the relative abundance varies by basin. We will investigate if there are distinct populations of *amoA* genes within each basin and the phylogenetic diversity of *amoA* in our samples. These basins are geochemically distinct and grant the opportunity to understand how geochemical variables affect the diversity and distribution of *amoA*. The study will lead to a greater understanding of AOA in distinct marine basins.

Poster # 109

**Testing the Response of Mutated Human Estrogen Alpha Receptor to EDCs Using *Saccharomyces cerevisiae*-Based Bioreporters***Amanda Garcia de Matos Amaral*

Student's Department: Microbiology

Faculty Mentor: Steven Ripp

Hydraulic fracking is an important process for shale gas extraction. It has caused an exponential growth of gas extraction in the United States, and is helping the country get a step closer to energy independence. However, this process has also raised questions about its impact on the environment. Millions of gallons of water are produced as waste from the process, increasing water stress in many areas that are already experiencing drought. Bioremediation is a possible way to treat and reuse the produced wastewater. Particularly, intrinsic bioremediation may be aided through the characterization and understanding of microorganisms present into the flowback water. The aim of this study is to

investigate raw and treated flowback from the Marcellus shale of Pennsylvania, and identifying all the microorganisms present and understanding their physiology. To do this DNA was extracted from the samples, and 16S rRNA gene amplicons sequencing was performed. The molecular and metagenomics techniques used will aid to explore and help to understand the physiology and metabolism of them the microbes present. This knowledge will be used to suggest intrinsic bioremediation capabilities of the microorganisms and treat the wastewater generated through the fracking process.

Poster # 110

### **Testing the Response of Mutated Human Estrogen Alpha Receptor to EDCs Using *Saccharomyces cerevisiae*-Based Bioreporters**

*Peter Hjorth*

Student's Department: Microbiology

Faculty Mentor: Steven Ripp

The Human estrogen receptor alpha (hER $\alpha$ ) is a key protein responsible for sensing estrogenic ligands and regulating genes and pathways that maintain the normal growth, reproduction and functioning of various tissues and organs. Malfunction of the hER $\alpha$  gene and its corresponding transcriptional pathways has been found to contribute to many critical human health issues such as breast cancer, osteoporosis, cardiovascular disease, obesity etc. In human cells, hER $\alpha$  becomes activated through the binding of 17 $\beta$ -estradiol (E2), but many chemical ligands originated from natural and synthetic sources were found capable of interfering with the function of hER $\alpha$  through the same ligand binding mechanism. Mutations of the hER $\alpha$  protein can also exist among different individuals. These differences may be subtle in the protein structure, but drastic when comparing the transcriptional activity across different hER $\alpha$  mutants. In order to understand the transcriptional effects of these variations, six yeast-based bioreporters expressing six mutated hER $\alpha$  proteins were constructed. Each of these strains also carry a plasmid with the bioluminescence-producing lux gene cassette (luxCDABD) and estrogen response element, allowing the production of light in the presence of estrogenic compounds. These bioreporters will be utilized to test the hormonal responses of six hER $\alpha$  protein mutants to various EDCs.

Poster # 111

### **Genetic engineering of a bioluminescent yeast bioreporter for the detection of dioxins**

*Enolia Marr, Greyson Ramos*

Student's Department: Microbiology

Faculty Mentor: Steven Ripp

Dioxin and dioxin-like compounds (DLCs) are persistent environmental pollutants that negatively impact humans and animals through their interaction with the aryl hydrocarbon receptor (AhR)/AhR nuclear translocator (ARNT) signaling system. Negative health effects resulting from this interaction include impairment of the immune, nervous, endocrine, and reproductive systems and increased incidences of several types of cancer; therefore, DLC detection is of great importance. A bioluminescent dioxin reporter was originally generated by transforming a reporter plasmid pDRE5-MEL1-Lux-U into a *Saccharomyces cerevisiae* strain with the AhR and ARNT genes integrated into its genome. The pDRE5-MEL1-Lux-U plasmid contains the bacterial luciferase operon (luxCDABEfp) under the regulation of a modified MEL1 promoter in which the native enhancer was replaced by five tandem copies of the dioxin response elements (DRE). Successfully transformed clones were responsive to benzo[a]pyrene, demonstrating the dioxin-inducible activity of the DRE5-MEL1 promoter. However, a lower-than-expected sensitivity was observed due to the presence of tryptophan in the medium. As an AhR ligand, tryptophan can interfere with the assay performance. To improve bioreporter sensitivity, ongoing work include engineering a new reporter vector pDRE5-MEL1-Lux-T by replacing the URA3 gene within the current plasmid with the TRP1 gene isolated from pBEVY-T. This new vector will be transformed into the AhR/ARNT-containing *S. cerevisiae* strain to a tryptophan auxotrophic bioreporter to improve its sensitivity.

Poster # 112

**Assessing Ecological Impact of Clay Flocculation Techniques by Measuring Microbial Community Structure***Kathryn Mcbride*

Student's Department: Microbiology

Faculty Mentor: Terry Hazen

Clay flocculation is a recently developed technique that restores water systems experiencing harmful algal blooms; but the ecological impact of flocculation on the quality of these water systems has not been thoroughly studied. This project aims to assess the ecological impact of different flocculation treatments by measuring microbial community structure. In order to do this, sedimentary columns treated with three different types of flocculation were tested to observe microbial community composition. For this, one of the methods used was 16s RNA sequencing, which gave a general profile of microbial diversity; the other method was Phospholipid Fatty Acid (PLFA) analysis, which measures biomass in relation to the community structure. The results of the 16s RNA sequencing showed no significant variation in microbial composition between the different flocculation treatments and control. Preliminary PLFA results suggest small changes in the biomass between different techniques. Results of this project entail that flocculation may still have an impact on microbial community structure, which could lead to alteration of nutrient levels in sediment and affect overall water quality. This study can help broaden our understanding of potential ecological impact of clay flocculation on water and in sedimentary environments.

Poster # 113

**Abundance and Diversity of Thaumarchaeota in Four Ocean Basins***Kendall Whitt*

Student's Department: Microbiology

Faculty Mentor: Terry Hazen

Microbes are the most prevalent living organisms in the world. They are found in almost every environment on earth, and are essential for the cycling of nutrients, such as carbon and nitrogen, in the environment. The nitrogen cycle is essential to life as it converts nitrogen into forms that can be used as nutrients for life. While much is known about the nitrogen cycle in soils, less is known about the marine nitrogen cycle. Recently, Thaumarchaeota, members of the Domain Archaea have been found to be major contributors to the nitrogen cycle in marine environments. Very little is known about the diversity and distribution of Thaumarchaeota in the world's oceans. This study aims to determine the abundance and diversity of Thaumarchaeota in four ocean basins. We performed qPCR to determine the copy number of genes from Thaumarchaeotes and used statistical analyses to determine differences in gene abundance between basins. Additionally, we investigated the correlations between gene abundance and different environmental factors. 16S rRNA sequences of Thaumarchaeotes were also used to investigate the diversity of Thaumarchaeotes in different environments. Preliminary data shows certain Thaumarchaeotes are specific to particular marine locations and their abundance is related to different environmental factors.

Poster # 114

**Genomic Diversity of Pseudoaltermonas species from Geographically Distant Marine Basins***Erika Youngquist*

Student's Department: Microbiology

Faculty Mentor: Terry Hazen

Microbes are extremely diverse and capable of catalyzing many functions. Currently, microbial species are defined through characterization of the microbe's metabolism and through sequencing of 16S rRNA. Recent studies suggest that microbes classified as the same species through 16S rRNA sequencing may demonstrate high genetic diversity. The goal of the study is to identify how much genomic diversity exists within a single species from different marine locations. Differences in the physical and chemical parameters of these locations may select for particular

populations of microbes capable of growing in these environments. We isolated 99 microbial strains from the coasts of Australia, Angola, and Bermuda. Out of those isolates, we chose 32 *Pseudoalteromonas* spp. that have greater than 99% 16S rRNA identity. We will sequence the entire genomes of the 32 strains and compare their genomes to better understand the genomic heterogeneity within this species. This work will result in a better understanding of biogeographic patterns in marine microbial species. We hope that this work will demonstrate the utility of performing whole genome sequencing to differentiate between closely related taxa.

Poster # 115

### **FERN: A Reaction Network Solver for GPUs**

*Andrew Belt*

Student's Department: Physics and Astronomy

Faculty Mentor: Michael Guidry

We demonstrate a computationally efficient implementation of recently-developed fast explicit kinetic integration algorithms. With Oak Ridge National Laboratory's Titan supercomputer as a target and testing platform, we leverage its modern graphics processing unit (GPU) accelerators for massive parallelization of this algorithm. For a generic test case of a Type Ia supernova explosion having 150 isotopic species and 1604 reactions, this implementation on the GPU solves on the order of 100 networks in the same time as a single instance on a CPU. Effort is made to generalize this implementation to handle network sizes and connectivities typical of nuclear physics, atmospheric chemistry, combustion chemistry, and other applications in astrophysics through the use of a flexible application programming interface. Such an interface is also necessary for MPI-enabled applications across multiple computation nodes on supercomputers.

Poster # 116

### **Prototype Magnetic Shield Compensating Earth's Magnetic Field down to 1nT**

*Alexander Corlew, Zachery Markland*

Student's Department: Physics and Astronomy

Faculty Mentor: Yuri Kamyshkov

Some sensitive experiments require a magnetic fields below the nT level. The challenge becomes clear when the Earth's ~50,000 nT magnetic field is taken into account. Our prototype aims to compensate for the Earth's magnetic field and reduce the field inside the volume to approximately 1nT. To accomplish this challenge we have designed a cylinder comprised of three layers, and by using in the first layer active magnetic current supplied coils we will manipulate the magnetic field inside the volume. There are two active compensating coils and two Mu-metal (Magnetic Shield Corporation) passive shields. The active compensating coils consist of a solenoid along Z-axis and a set of I Helmholtz coils with cosine phi distribution to compensate magnetic field in the X-Y plane. In theory these two coils plus rotations should cancel out the majority of the Earth's Magnetic field within the volume. This field will be further reduced by two annealed passive shielding. Prototype is being studied for the possible experiment with ultra-cold neutrons at LANL (Los Alamos National Laboratory).

Poster # 117

### **Using SPLASH to Visualize Nucleosynthesis of Many Species in CHIMERA Simulation of Type IIA Supernovae Core Collapse**

*Amos Mannes Schmidt*

Student's Department: Physics and Astronomy

Faculty Mentor: William Hix

One of the goals of cosmology is accounting for how everything we see came to be in the abundances observed. A major contributor to the generation of many of the elements essential to life on earth is supernova. Theories of

nucleosynthesis are tested by comparison of dependent simulation data to observation. In the CHIMERA project, the propagation and generation of numerous species of elements are tracked using tracer particles each representative of a discrete chunk of mass. This allows the simulation to trace 150 different species in a radially symmetric regime. This project presents a simple way of visualizing that data as smoothed hydrodynamic data which can then be read by SPLASH, a tool for imaging just that. By inferring from geometry and relative position of each particle to its  $n$ th nearest neighbor, data necessary to visualization can be found such as corresponding smoothing lengths and densities. This result is compared to ideally equal data rendered directly by Chimera at higher resolutions. Upon sufficient agreement the low-resolution results are generated for species not rendered directly by Chimera due to excessive additional computational cost. Using these results predictions can be made about the end state of any of the 150 elemental species.

Poster # 118

### **Probing the Quark Gluon Plasma: Correlated Background Subtraction Method**

*Meghan Stuart*

Student's Department: Physics and Astronomy

Faculty Mentor: Christine Nattrass

The theory of quantum chromodynamics predicts the existence of the quark-gluon plasma at high energy density. At very high energies, the strong force binding quarks and gluons into nucleons breaks down and nucleon bounds become irrelevant. The QGP is produced and studied by colliding heavy nuclei in the Large Hadron Collider at CERN. To explore the medium's properties, scientists must measure how the medium alters jets traveling through it. This alteration, or suppression, can be seen through the loss of momentum and spreading of particles produced by a jet due to interactions with the nuclear matter. The problem with measuring jet suppression is the existence of a huge background of low momentum particles that are not part of the jet. This poses a problem with analysis, so I have been developing and testing a previously untested model for background subtraction and applying it to simulated data. Since the geometry of heavy ion collisions is not spherically symmetric, there is a pressure gradient that gives particles a momentum boost in certain directions. This effect can give false jets and creates more high-momentum particles in certain planes. The background due to this phenomenon is dependent on the geometry of the collision and can be expressed as a function of the Fourier decomposition of the collision geometry. The method takes into account this description of the background by using the data analysis program ROOT to fit a background correlated with the collisional geometry to simulated data like that which we would see being produced by the LHC.

Poster # 119

### **Equations of State for Neutron Stars**

*James Vacanti*

Student's Department: Physics and Astronomy

Faculty Mentor: Jirina Stone

Models of neutron stars are created from Equations of State. Computationally, these are given as tables. However, due to the differences in types of matter which exist at different parts of the star, multiple equations of state are needed. These must be stitched together in order to create a table which is as mathematically smooth as possible. This is done using a variety of methods. Finding the spots where these transitions are made has implications for the resulting star. Depending on the spot in the star where the transition happens, the modeled star may or may not be physically feasible.

Poster # 120

**Can mirror matter be detected on Earth?***Louis Varriano*

Student's Department: Physics and Astronomy

Faculty Mentor: Yuri Kamyshkov

A precise measurement of the neutron lifetime is important for calculating the rate at which nucleosynthesis occurred after the Big Bang. Two most precise recent measurements of the neutron lifetime performed by different techniques differ by about 3 standard deviations. This difference of 9.2 seconds can possibly be resolved by future experiments, but it may also be evidence of a new effect. This research investigates the possibility of explaining this difference by a mirror matter effect present in these experiments. Both mirror matter, a candidate for dark matter, and ordinary matter can have similar properties and self-interactions but will interact only gravitationally with each other, in accordance with observational evidence of dark matter. Although mirror matter does not couple to ordinary matter by Standard Model interactions, some additional interactions might exist, providing small mixing of ordinary matter neutral states, like the neutron, with mirror components. This work estimates the density of mirror dark matter particles needed to explain the difference between these two measurements of the neutron lifetime. Working under an assumed accumulation of mirror dark matter particles within the Earth and using the 9.2 s difference in the neutron lifetime observed by the two mentioned experiments, we can estimate the possible density of dark matter on the surface of Earth. The measured neutron lifetime difference thus might be an indication of the presence of dark matter on Earth. This work is in collaboration with Prof. Z. Berezhiani (University of L'Aquila, Italy) and Prof. Y. Kamyshkov (University of Tennessee).

Poster # 121

**Impact of Temporal Variations of Hydrology on Groundwater Geochemistry***Benjamin Adams*

Student's Department: Earth/Planetary Sciences

Faculty Mentor: Terry Hazen

The Department of Energy's (DOE) Oak Ridge field research uncontaminated site is located within the Bear Creek Valley (BCV) in Oak Ridge, TN. At the site there are 6 groundwater monitoring wells of multiple depths ranging from 20-71ft deep. Previous hydrologic and geochemical studies have identified the presence of two geochemically distinct groundwater zones, as well as, fluctuations in the gradients between flow in shallow and deep wells. Although we know that fluctuations occur in the height of the hydraulic head, it is unclear how these variations affect the geochemistry in shallow versus deep wells. The goals of this study are to (1) determine the direction and magnitude of the horizontal and vertical hydraulic gradients, and (2) determine how the stability (or instability) of the hydraulic head impacts groundwater geochemistry. Use of In-Situ Aqua TROLL® 200 CTD Logger allowed for continual monitoring of the following physical parameters; conductivity, dissolved oxygen, and water level/pressure. Using water level/pressure, we determined direction and magnitude of the horizontal and vertical hydraulic gradients. By combining geochemical data and time-series hydrologic data from the 6 wells, we hope to better understand the geochemical response to variations in hydraulic gradient.

Poster # 122

**Photometry of scattered disk objects in the outer Solar System***Chad Melton*

Student's Department: Earth/Planetary Sciences

Faculty Mentor: Joshua Emery

Of the estimated 100,000 icy bodies in the outer Solar System, the diverse and volatile-rich, scattered disk objects (SDO) are some of the most unique discovered. SDOs have been gravitationally disturbed by an orbital migration

of the ice giant Neptune, as the planet moved outwardly, scattering objects within certain orbital resonances. SDOs are characterized by highly eccentric orbits and have a degree of inclination as well. Objects in the SDO family range in size from small (~55R (km)) to slightly larger than Pluto (1184 R (km)). We observed SDOs with sizes and distances at perihelion/aphelion measurements of (~35 AU-867AU) and radii (~64 km- 400km). Broadband data was gathered from 34 objects using the Infrared Array Camera (IRAC) aboard the NASA Spitzer Space Telescope at 3.6  $\mu\text{m}$  (channel 1) and 4.5  $\mu\text{m}$  (channel 2) in order to determine flux and albedo. The collected photometric data is a powerful tool in determining surface compositions (H<sub>2</sub>O, CH<sub>4</sub>, CO<sub>2</sub>, hydrocarbons) that we expect to compose these bodies. SDOs and other Kuiper Belt classes, can give us a deeper understanding into the 4.5 Gy history of our Solar System.

Poster # 123

### **Using GIS to Evaluate Impacts on Local Population From Particulate Matter Due to Increasing Military Vehicle Traffic at U.S. Military Bases**

*Darcy Ayers*

Student's Department: Anthropology

Faculty Mentor: Hyun Kim

This project uses GIS and an anthropological perspective to identify local populations surrounding Pohakuloa Training Area (PTA) that are most at risk from military vehicle-generated dust. Using ArcGIS, the following data was analyzed in order to better understand impacts from dust on the local population: • Prevailing wind rose data from National Water and Climate Center under the USDA National Resources Conservation Service, • Digital Elevation Model (DEM) map of the island provided by National Elevation Dataset from USGS, and • The US Census data of the local population distribution surrounding the military base at PTA. When studying demographics, I evaluated the spatial distribution and density of the adjacent population. The resulting GIS data was a combination of my own dust dispersion estimates (from wind, topography, and distance from source) with my demographic research in order to determine the risk associated with populations on the island of Hawaii. The current populations being subjected to high levels of dust exposure were identified and quantified through a rudimentary algorithm relating the variables considered. The resulting map portrayed the spatial distribution of the generated dust across the island and identified the populations which will be experiencing significant impacts due to the dust dispersion.

Poster # 124

### **Teacher-student Relationship Quality as a Predictor of Loneliness in Children**

*Laura Beard, Rachel Welsh*

Student's Department: Psychology

Faculty Mentor: Lawrence Elledge

The association between teacher-student relationship quality (TSRQ) and children's social adjustment is understudied. There is evidence that peer acceptance is partially influenced by the degree to which classmates are perceived as having positive or negative relationships with the teacher (Hughes et al., 2001). An emerging body of literature suggests that a high quality teacher-student relationship may buffer children from the impact of a negative social reputation on their risk for peer victimization (Elledge et al., under review; Troop-Gordon & Kuntz, 2013). The present study examined the concurrent and longitudinal relation between TSRQ and loneliness. Participants were 331 2nd - 4th grade children (51.8% male; 67% Caucasian). TSRQ was assessed via peer-nomination items. Loneliness was assessed through self- and peer-report. TSRQ was negatively associated with self- ( $b = -.24, p < .05$ ) and peer-reported ( $b = -.30, p < .05$ ) loneliness. However, TSRQ did not predict changes in self- or peer-reported loneliness overtime. Findings suggest children with low quality relationships with their teachers are often lonely, but that TSRQ may not explain changes in children's loneliness overtime. Further studies are needed to more fully understand the association between TSRQ and loneliness.

Poster # 125

**Emotion Dysregulation, Gender, and Intimate Partner Violence Perpetration: An Exploratory Study***Chloe Bliton*

Student's Department: Psychology

Faculty Mentor: Gregory Stuart

Intimate partner violence (IPV) is alarmingly prevalent and has devastating consequences. Research has generally supported the conceptualization of IPV as bidirectional and perpetrated by both men and women and that emotion regulation difficulties may influence IPV perpetration among men and women. This cross-sectional survey study of 598 college students in dating relationships investigated the relationships between two important factors related to IPV perpetration: gender and emotion dysregulation. Findings supported previous research and illustrated an association between difficulties in emotion regulation and IPV perpetration. The bivariate associations between IPV and emotion dysregulation differed by gender, such that female-perpetrated violence was associated with lack of emotional awareness and difficulties in goal-directed behavior while male-perpetrated violence was not associated with these difficulties in emotion regulation. However, interactions between gender and emotion dysregulation were not supported in multivariate analyses. These findings suggest that targeting emotion regulation deficits may be fruitful for reducing IPV in both men and women. Keywords: emotion regulation, intimate partner violence, dating violence, gender differences

Poster # 126

**The Inquisition of the Inca Incision: An Investigation into the Uses of Various Organic Species During the Process of Trephination in pre-Columbian Cuzco, Peru***Mikhayla Stover, Timothy Herman*

Student's Department: Anthropology

Faculty Mentor: Stephen Carmody

Trephination (also known as trepanning) is the surgical practice of forming an opening in the skull, named for the instrument used to perform the procedure, a trephine. This practice has been recorded through history, from pre-scientific times to modern medicine, where it is now referred to as a craniotomy. Our research was an inquiry into the practice specifically performed by the Inca people of Cuzco, Peru in the pre-Columbian period. The Inca Empire was a highly developed nation situated in the Andes mountains largely in Peru and Ecuador. They were known to be experienced in medicine and anatomy, and at least 66 individuals were found with evidence of trephination. The process of trephination is extremely invasive, and the use of various medicinal plants was used to minimize the painful effects of surgery. Chicha was used to induce unconsciousness, tobacco was used as a painkiller, and coca was used as a vasoconstrictor. Together these organic anesthetics allowed for physical pain relief as well as, in the case of the coca plant, to have surgical uses like suppressing the flow of blood during surgery. This research was performed in order to receive a better understanding of the complexities of this Inca medicinal procedure and gain an insight into how the Inca people performed neurosurgery. By investigating the uses of the chicha, tobacco, and coca plants in pre-Columbian surgery, we might also find ways in modern medicine that these plants can or have been effectively utilized, allowing the processes of the past to guide us in the future.

Poster # 127

**Two Sides of the Same Street: Where You Are Born, Where You Go, and How Much Say You Really Have In the Matter***Shivani Goyal*

Student's Department: Psychology

Faculty Mentor: Bob Kronick

Quantitative and qualitative analysis are used to measure the impact of one's surroundings on life outcomes. The focus is on two local neighborhoods, Pond Gap and Sequoyah Hills, that are close in proximity but one is upper-class

while the other is working-class. The analysis compares the following: demographics, income and wealth, family structure, school socioeconomic status, crime rates, housing, and access to transportation, healthy food and health services. The methodology includes surveys of 20 residents and interviews with five residents from each neighborhood, selected through random sampling. I hypothesize that the participants' current neighborhood will reflect the socioeconomic status in which they were born and raised. I further hypothesize that their home and neighborhood environments throughout their development will be correlated with their access to resources. I will examine how these factors affect the lives of the participants and their children to determine the implications for generational poverty or wealth and the opportunity gap. The study is in progress and therefore, there are presently no conclusions to report. Due to the small number of participants, this study is not completely representative of the neighborhoods. However, it will help in identifying factors for a future study involving a larger neighborhood sample.

Poster # 128

**Understanding difficulties in student learning through examination of study strategies and motivational problems in college students with self-reported attention and learning problems.**

*Rachel Mottern, Ashleigh Mcginnis*

Student's Department: Psychology

Faculty Mentor: Jenn Bolden

The purposed study will examine self-reported attention and learning problems in a college sample. The study seeks to understand the extent to which self-reported attention problems contribute to the skills related to academic success: namely study strategies, note-taking, listening skills, reading & comprehension strategies, writing, research skills, test taking strategies, organizational techniques, time management, academic motivation, text anxiety, and attention and concentration. Approximately 200 undergraduate students will complete the following measures: A Demographic Questionnaire (DQ), Barkley Deficits in Executive Functioning Scale, Barkley Adult ADHD Rating Scale-IV (BAARS-IV), Adult ADHD Self-Report Scale (ASRS-v1.1) Symptom Checklist, and the School Motivation and Learning Strategies Inventory (SMALSI). Students with self-reported attention problems are predicted to score higher on the Problematic Concentration/ Attention Difficulties construct. Gender differences among five of the primary constructs: Low Academic Motivation (LOMOT), Test Anxiety (TANX), Organizational Techniques (ORG), Time Management (TIME), and Concentration/Attention Difficulties (CONDIF) will be examined. Students with attention and learning problems are predicted to have lower high school and college grade point averages and academic motivation relative to students without attention problems.

Poster # 129

**Motivation and Anxiety Levels**

*Joshua O'Banion*

Student's Department: Psychology

Faculty Mentor: Debora Baldwin

Motivational videos are widespread within social media. This preliminary study examined the effect of motivational videos on anxiety levels. Ten females and 11 males, with a mean age of 26.38, were randomly assigned to one of two groups. The experimental group (n=12) watched a seven minute motivational video, whereas the control group (n=9) watched a nature video for a seven minutes. All groups were then exposed to a seven minute surgery video. Both self-report (anxiety levels and mood) and physiological measures (heart rate) were assessed. It was hypothesized that the motivational video would decrease levels of anxiety. Data analysis indicated no significant difference between groups on the dependent variables. However, negative mood was significantly correlated with heart rate during the surgery video and at rest. Further, there was a significant positive correlation between trait anxiety and resting heart rate in men only. In conclusion, gender differences may be driving these effects.

## School of Art, College of Arts and Sciences

Poster # 17

### Art Movement

*Rebekah Bennett, Vincent Walker*

Student's Department: Art

Faculty Mentor: Sarah Lowe

In today's society, it is easy to create a sedentary lifestyle through the increased availability of technology. Children are no different. Today, kids spend time playing video games, browsing the Inter-net, and participating in social media more than ever before, thus creating a less active, less creative environment. Children have an abundant supply of energy and imagination that technology often diminishes. As children's schedules become more busy and schools have begun cutting out art classes as well as recess, children have less time to be creative and active. Since elementary kids are naturally fascinated with art activities and play; games are a compelling method for incorporating physical movement and creative ex-pression to tap into a child's fascination with both. The goal of this project is to create an educational game to allow teachers, after school programs, and families to affordably have an avenue for their child to be creative and active simultaneously. The game combines two favorite subjects in elementary schools, art and recess, through hands on learning activities. Kids will learn about colors, shapes, and composition, while enhancing their motor skills. In addition, the game will naturally aid in the devel-opment of creative and critical thinking skills through tasks that require problem solving. The overarching goal of this game is to increase children's physical movement and stimulate learning.

Poster # 18

### A Quality of Life; Piper's Cannabis Story

*Katie Counts*

Student's Department: Art

Faculty Mentor: Paul Harrill

"A Quality of Life; Piper's Cannabis Story" is an eight-minute documentary filmed just one week after Piper, who suffers from intractable epilepsy, was weaned completely off of pharmaceuticals since finding seizure relief in cannabis oil. Supplementing the film, a website of the same name is available, including more in-depth information and links to resources and advocacy programs. On August 19, 2011 Piper was born completely missing her corpus callosum, the bridge that connects the right and left sides of the brain. At three months old the spasms started, and much of Piper's first six months were spent in and out of hospitals. Finally, after months of confusion and perseverance, Piper was diagnosed with Aicardi Syndrome, a rare genetic disorder. To combat the life-threatening seizures, doctors prescribed pharmaceuticals, some of which were dangerous and further hindered Piper's cognitive and physical development. Showing no improvements, Piper's parents were given one last option, a drug that would cause kidney and liver failure. So they started doing their own research, then moved from Tennessee to Colorado, one of only two states where the low THC strain of cannabis, Charlotte's Web, is currently available and legal for pediatric patients. Since starting the cannabidiol, her tonic seizures have gone from several hours a day to less than ten minutes. Piper is happier and healthier than she ever has been. No one can cure Piper's disorder, and there are no right or wrong answers, but what Piper, and all of us, has is hope. Thanks to her pioneering parents and advocates, Piper will have "A Quality of Life".

**An Atomic Legacy***Allan Namiotkiewicz*

Student's Department: Art

Faculty Mentor: Paul Harrill

An Atomic Legacy is a brief historical documentary about the community of Oak Ridge, Tennessee, and their contribution to the end of World War 2. The film provides facts and information provided by Ray Smith, who is the Y12 Plant's official historian. The film explores areas around the community of Oak Ridge, as Ray Smith describes details of the sacrifices made by its citizens. The film also includes Cherokee music by Dennis Sizemore. Ray Smith tells the stories and facts provided in the film. He was appointed to the title of Historian after working on the plant for over 35 years. I interviewed him in October of 2014 as part of my project in Professor Paul Harrill's class. The class was assigned a documentary project of our choice as a final project. Since I have a strong interest in learning more about this community's past, I contacted the Y12 plant to begin my research. I was eventually directed to Ray Smith, who has also produced documentaries about the Y12 plant in Oak Ridge. He was happy to share the details that are discussed in the film. The film begins with some general information about the plant. Ray Smith describes some of the community's members who are well known, and their experiences related to the government's seizure of the land. These stories are accompanied by multiple shots of the Oak Ridge area, including drone footage at the Melton Hill Dam park near Oak Ridge, and footage taken at the New Hope Center Museum on the Y12 plant. The entire film includes Cherokee music shared by Dennis Sizemore. The music works as a slight layer of history to the area discussed. (An Atomic Legacy – Documentary - 6:48 – Fall 2014 – ARTC436 – Professor Paul Harrill)

**Be Brave, Be Strong: A Documentary***Micah Russell*

Student's Department: Interdisciplinary Programs

Faculty Mentor: Paul Harrill

This film tells the story of a young boy, struggling with the realities of pediatric cancer and the strength it takes for him to find a balance between the hospital and everyday life. The film opens on Brooks Russell at age 5, having a needle injected into a "port" underneath his skin at a hospital. The film then switches back and forth between the life of a 5 year old boy and the treatments he receives at the hospital. The story shows different moments during Brooks' chemotherapy treatment. The audience will see the everyday process he goes through when he visits the hospital for chemotherapy or MRI's. The audience sees the world he is experiencing how he experiences it, almost through his eyes. It is a rare moment that we see other adults outside of Brooks' perspective and mostly only hears them speak in the background. Majority of the time, they are either telling stories of their own children's experiences with cancer and treatment or carrying casual conversation. Other times we hear Brooks' parents talking about his situation and prior experience since his diagnoses or speaking to nurses and doctors. The story continues to evolve by showing Brooks play baseball, attempting some sort of normalcy in his life. We also see his friends and family celebrating his birthday at a minor league baseball game and attending a party for his last dose of treatment. I hope the viewers will leave understanding at least some of the things that children with pediatric cancer have to actually go through, how its not always just the smiling bald kid on the TV commercials. Hopefully the film will get people talking about this terrible disease more often and putting the attention on the same level as the better known forms of cancer.

Poster # 75

**Latino Literacy: A Bilingual Communication Guide***Brayan Zavala*

Student's Department: Art

Faculty Mentor: Sarah Lowe

There are many factors that can contribute to low reading comprehension among young Latino children. Through an ethnographic study of Latino mothers conducted over the summer of 2014, certain patterns emerged. A few patterns were expected such as children not liking to read and parents not being able to help with their child's homework due to the language barrier. However, an unexpected finding was the frustration from Latino parents voicing difficulty communicating with their child's teacher in order to assist their child at home. This not only affects literacy but it also affects their child's overall academic success. Therefore, to address this finding and aid in facilitating parent-teacher communication, a set of bilingual resources were developed to strengthen the connection between parents and teachers. The goal of this outcome is to empower Latino parents' involvement in their child's education

Poster # 76

**1 Day***Andrea Allison*

Student's Department: Art

Faculty Mentor: Sarah Lowe

As a byproduct of my initial research on big corporate businesses, I became aware of the problematic demands of outsourcing from international labor-intensive factories. Unfair working conditions continually infringe on simple inalienable rights in emerging economies worldwide. This study specifically addresses factory laborers working overtime. This informed my theme of endurance which prevails throughout my multi-part design. The design, in the form of an invitation, presents a hypothetical conference for corporate heads and human rights activists to reform and standardize labor hours in factories worldwide particularly athletic brands such as Nike, Adidas, and Reebok.

Poster # 77

**AccentKnoxville- Promoting the International Cultures in Knoxville, TN.***Samuel Bendriem, Brayan Zavala*

Student's Department: Art

Faculty Mentor: Sarah Lowe

According to the 2010 US Census Bureau, 85% of Knoxville's population is considered white. While it may seem very homogeneous, in actuality, Knoxville is very internationally and culturally diverse—being home to many nationalities who share their cultural heritage through organized communities, local establishments, festivals and events. These range from the well known gatherings such as the Hola and Rossini Festivals, to lesser known celebrations, such as Kuumba Fest and Israeli Fest, to stores and restaurants, such as the El Girasol Supermarket and King Tut's. Unfortunately, it's more often through word-of-mouth or happenstance that residents delightfully stumble upon these experiences. The lack of a collective resource to promote such cultural groups and activities results in a missed opportunity for all Knoxvilleians to explore and appreciate new cultural experiences. For Knoxville to become the proud and diverse city it very well can be, a central portal is needed to showcase the people and events that make it so. This project serves as a resource for international communities to present necessary information about cultural celebrations and establishments allowing residents to become more aware, and appreciative, of the myriad cultures that reside within our city.

Poster # 78

**Back Those Little Habits***Stephanie Bullock, Heather Mcnamara, Thomas Foltz*

Student's Department: Art

Faculty Mentor: Carolyn Staples

While exploring student health, as it relates to users on campus, we observed that students could make small changes in their habits to better their life on campus. The habit we chose to focus on was the proper use and carrying of backpacks through informed ergonomic application. Initial exploration was focused on correcting physiology but after further research we discovered the problem stemmed from social perceptions and habits. We addressed this issue by informing the student body and encouraging them to alter their backpack habits with a humorous tone of voice. By using signage and integrating other elements (buttons and social media) a campaign is created and grows with the participation of students. The ultimate goal is to reveal that small habitual changes can have long lasting impacts.

Poster # 79

**UTK Lite Abstract Submission***Stephanie Bullock*

Student's Department: Art

Faculty Mentor: Carolyn Staples

This project is a reassessment of The University of Tennessee's mobile app. Student perception finds the mobile app lacking in comparison to other forms of communication (web + email etc..) offered by the University. Technology is increasingly mobile and requires purpose, and education technology is not an exception to this rule. Through the use of user testing, interviews and feedback, it was realized that the current mobile application produced by the University of Tennessee does not adequately meet the needs of students and therefore is lacking in its purpose. The current design provides minimal focus on academics and contains usability issues. The goal of the redesign was to address these issues and create a more pleasant and functional experience that would serve the students more appropriately.

Poster # 80

**Breaking Bad: Reconstructing Ancient Roman Artists and Pottery Workshops using Reflectance Transformation Imaging (RTI)***Sarah Doktycz, Peyton Nipp, Kaitlyn Nagel, Miranda Pedigo, La'Bria Wimberly, Chloe Lovelace, Kalyn Newport, Anthony Parrott, Joseph Sandor, Quentin Eastridge, Cory Bailey, Micah Mitchell, Kerri Ross*

Student's Department: English

Faculty Mentor: Robert Darby

Ancient Roman art is as complex, beautiful, and diverse as its empire was vast. Countless artistic works and objects of varying styles and media were produced, a mere fragment of which now fill the collections of the world's museums. Yet, despite this abundance, there is surprisingly little data regarding the artists and artisans responsible for its production. Terra Sigillata, a type of Roman fine-ware pottery identified by a distinctive red slip, relief decorations, and stamped designs, offers an avenue rich for investigation regarding the identities of these often elusive individuals and their ephemeral workshops. This poster presents the preliminary results of research analyzing a group of previously unidentified potters stamps and decorative reliefs found on Gallic Sigillata in the collections of the McClung Museum of Natural History and Culture at the University of Tennessee. Using state-of-the-art Reflectance Transformation Imaging (RTI) technology and techniques to examine these oft ignored fragments of Roman art our research brings together the Arts and Sciences in a tangible way that exemplifies "Digital Humanities" while simultaneously furthering our knowledge about ancient Roman artists and their work.

Poster # 81

**Phone Down, Look Around***Alexander Dunlap, Hayden Zelem, Ricardo Bolivar, Anne Fromke*

Student's Department: Art

Faculty Mentor: Carolyn Staples

The implementation of cell phone lane signage causes us to rethink our interactions with those around us while using our phones. Mobile devices impact our daily lives more than we realize. As a result, cities all over the world are using signage to change how we interact with our environment. After a series of observations around campus, we noticed that phone users tend to inconvenience other pedestrians. We found that they unintentionally block the flow of traffic and interrupt real social interactions in order to use their mobile devices. To better understand the problem, we interviewed students about their experiences on pedestrian pathways around campus. Many students admitted that they collided with other students using their phones or that they had been inconvenienced by someone who was using their phone while walking. In addition, we conducted an ethnographic study of traveling patterns in traffic-heavy areas between classes. To test the validity of our observations, we put in place a series of 'phone lanes' that encouraged phone users to walk to the side of the pathway to create a more courteous and efficient pedestrian traffic environment.

Poster # 82

**Pocket Vet: Quick Calc***Thomas Foltz*

Student's Department: Art

Faculty Mentor: Carolyn Staples

In Veterinary Practice there often isn't time to thumb through a massive textbook or hunt down to the Vet to double check measurements on medications. As a former professional in the Veterinary field, I have first hand experience with the necessity of quick responses and accurate measurements. Using my experiences in the field and from working with doctors still in practice I developed a Smartphone App concept that takes all the information from Plumb's Veterinary Drug Handbook and other medical sources into a convenient dosage calculator where all you need is the patient's species and weight. With the rise in smartphone tech and the availability to almost anyone I see this as the next step in optimal patient care.

Poster # 83

**McClung Museum: The Sensory Experience***Anne Fromke, Alexander Dunlap, Ricardo Bolivar, Heather Mcnamara*

Student's Department: Art

Faculty Mentor: Sarah Lowe

In the modern world, museums are exploring the use of technology to engage visitors in their exhibits. With the popularity of mobile devices, digital applications are becoming a widely used forum for interactive experiences. In the case of the McClung Museum, this kind of technology is not currently being used to facilitate the exploration of the exhibits, creating a very static atmosphere. Exploring possible interactive app experiences to enhance and engage the visitor with the exhibit was the basis of our research. Through discussions with the McClung museum, it was determined that we would explore the exhibit through the 'body lens'. In other words, we analyzed the physical objects in the exhibit in relevance to their uses. Using the data we collected, we transformed the space and expanded the exhibit through the use of an augmented reality-based environment.

Poster # 84

**Enlightened Effortless Way-Finding***Alyssa Gauci, Andrea Allison, Benjamin Maxey, Eleanor Veazie*

Student's Department: Art

Faculty Mentor: Carolyn Staples

We all recalled the misplacement we felt when we first came to the University of Tennessee as freshman. This caused us to ask if there might be a way to identify the basic "navigation tools" necessary for exploration. Our curiosity about how to move people to better pathways led us to design a universal, inner building way-finding system, that could be implemented throughout the University of Tennessee's campus. Whether you are a visitor, everyday student, staff member or have a disability, our primary objective was to create an effortless way-finding system that not only enlightened users, but also delighted them. We conducted primary research through several sessions of observations, interviews, and empathy-navigation exercises. This research informed us on how tenuous the current way-finding system is and how it leads to greater confusion. By using the university's extended color palette and typefaces, we designed a system of directories, iconography, and signage that would be displayed throughout all of the buildings on campus.

Poster # 86

**ILLiterature***Michael McAdams*

Student's Department: Art

Faculty Mentor: Sarah Lowe

In today's world, it is nearly impossible to avoid hearing rap/hip hop music. Unfortunately, rap is often viewed as unintelligent and is not valued as a form of art despite its popularity. In order to overcome these negative stereotypes, hip hop songs that promote the use of literary elements such as metaphor, rhyme, personification and rhythm, should be recognized for their artistic merit. I want to bring attention to rappers like Aesop Rock, whose body of work contains a wider range of vocabulary than Shakespeare's writing. This project intends to showcase these poetic devices found in certain rap lyrics in order to improve the respect and understanding for the artistic merit within these lyrics. This is not to say that all rap is poetic, rather that there is an overgeneralized stereotype perpetuated by popular culture that often clouds the perception of the entire genre. ILLiterature is an online tool that allows an administrator to input rap lyrics and identify literary elements within the writing. The resulting interface allows a user the opportunity to see devices in action. ILLiterature presents the complexity and technical skills that hip hop artists use in their medium. By acknowledging literary tactics used by rappers, listeners gain a new appreciation for the music.

Poster # 87

**Branding Cleveland, TN: A Smart Community Initiative***Victoria Salvador, Aimee Chico, Madeline Lane, Jordan Dronebarger, Allen Minecci, Rebekah Bennett*

Student's Department: Art

Faculty Mentor: Deborah Shmerler

The city of Cleveland, Tennessee is expecting to dramatically increase its population over the next 15 years. This growth creates an interesting dynamic between Cleveland's history as a small, quiet, southern town and its emergence as a significant economic hot spot within the state. In preparation for future expansion, the city and the UT Provost Office approached the SOA Graphic Design senior class in FA14 to articulate a Strategic Brief for the development of consistent Brand messaging for the city of Cleveland. This project will explain what we discovered about Cleveland's citizens as well as the city's history, landmarks, and unique features. It will also demonstrate how that information was synthesized into a Vision Statement, Mission Statement and Unique Value Proposition for the city. Finally, we will explain how those verbal statements were translated into a visual identity. This project is a part of the UT Smart

Communities Initiative.

Poster # 88

### **Kitchen Sink Co-Op**

*Kaitlyn Shaw*

Student's Department: Art

Faculty Mentor: Sarah Lowe

Food is both a necessity and cultural indicator. While some cultures are resourceful and efficiently utilize it to the fullest, others, like the United States, are accustomed to easily accessible food where 30% of all food is thrown away each year. This abundance of accessible food, found in grocery stores and restaurants, leads to wastefulness. Americans over-purchase, and under-consume. While distributors and consumers are to blame for this problem, there are less initiatives for reducing food waste once food has been brought home. However, if Americans would prioritize food conservation, as done in WWI and WWII, there would be less frivolous food waste. If consumers efficiently used their food and made its conservation a priority, less would be wasted. Resourceful cooking was a nation-wide focus during WWI and WWII; this is not a new concept, but one that needs to be reintroduced. Less food waste means more available resources, like water and land. Reintroducing this war era mindset into our food culture's paradigm could reduce food waste. This project intends to educate home cooks about using the most of their perishable food, so they can reduce their contribution to this growing problem.

Poster # 89

### **I Don't Want to Live Without You**

*Alanna Wilkinson*

Student's Department: Art

Faculty Mentor: Paul Harrill

One side of a cassette tape preserves a pivotal moment between two lovers from two different worlds. Through a recorded phone conversation and various mixtapes, a real story of true love unfolds between Navyman, Keith Wilkinson and waitress, Evelyn Espejo as they prepare for their new lives together in the United States. A black screen begins the story as the sound of a play button is pressed, and audio from a phone conversation is heard. Subtitles accompany the sound at the bottom of the screen. There is a cut to a photograph of Keith in his Navy uniform as Evelyn explains how she first met him. Other photographs are presented, and Keith gives his response. Audio from the tape plays again, and more photos are shown in reference to the phone conversation as the viewer cuts in between the past and the present. The story peaks when the conversation moves to Evelyn's permanent trip to the United States. I was inspired to create this after thinking about the idea of true love as it is portrayed in fiction versus in reality. In fiction, true love is something that is created through situations of high intensity and conflict that often times sets extremely high standards that cannot be met in real life. Because of this, there are phrases like "hopeless romantic," which refers to a person who wants love but just cannot obtain it; however, my parents have proved to me that true love does exist through their actions every day.

Poster # 90

### **The Decorative Duel**

*Elea Wright, Alexandra Raykowitz, Stephanie Bullock, Jennifer Krukowski*

Student's Department: Art

Faculty Mentor: Carolyn Staples

Seeking improvement for their Decorative Experience gallery, our group was approached by the McClung Museum with the goal of energizing their space through the use of technology using the lens of contemporary relevance, or making history relevant to modern life. We defined the spectrum of our audience as all visitors to the

McClung Museum, with a specific focus on making the content accessible to a 7th grade reading level. As part of our competitive audit, we researched gamification and it's positive effects on learning outcomes. We also explored aspects of empathy to understand the relationship between the human emotional reaction as it might apply to the game interface. From a content standpoint, we explored the historical objects and projected them into a modern context. To allow the visitor to enjoy the activity of exploration, we designed an interactive scavenger hunt game within the gallery space. We extended the gallery space through social media. The mobile game app is designed to engage visitors, encourage closer observation, inspire critical thinking, and promote curiosity of the objects in the exhibit.

## School of Music, College of Arts and Sciences

Exhibit #15

### **Scherzo No. 2, Opus 31 in Bb minor by Frederic Chopin**

*Wesley Carroll, Piano*

Faculty Mentor: Fay Adams

Exhibit #15

### **Sonata Opus 19, 3rd Movement by Paul Creston**

*Sid Warren, Alto Saxophone*

Faculty Mentor: Allison Adams

Exhibit #15

### **Fear no more the heat o' the sun by Gerald Finzi**

*Tyler Padgett, Baritone*

Faculty Mentor: Andrew Skoog

## Haslam College of Business

Poster # 178

### **Event Study: Pres. Obama's Re-election and the Stock Market**

*Robert Graham*

Student's Department: Accounting

Faculty Mentor: Phillip Daves

This purpose of this event study is to examine any immediate impact on the stock market after President Obama's re-election, specifically examining the effects on different industries of business. I am most interested in what role the election played in the valuation of the healthcare industry. This study is done for the Global Leadership Scholars Program through the Haslam College of Business, and my thesis advisor is Dr. Phillip Daves.

Poster # 179

### **Please Mind the GAAP: Advanced Compliance with FRC Reporting Changes**

*Amanda Prevost*

Student's Department: Accounting

Faculty Mentor: Joseph Carcello

When changes occur in regulators' requirements, firms should be prepared to meet these standards in a timely manner. The UK's leading audit regulator, the Financial Reporting Council, issued revisions to the UK Corporate Governance Code in December 2011 regarding audit committee disclosures. My study will examine firms that were proactive in their compliance before the required deadline of 1 October 2013, and what factors in the company's profile may have influenced that. Specifically, I will be observing sample firms' industry, longevity as a public entity, whether they are internationally established, and the auditor's reputation (i.e. Big Four auditors vs. not). I am currently in the process of determining the compliance level of each firm in my sample. Thus far, several trends have become apparent.

Many firms were already employing these requirements prior to Code revision, many who did not comply made references in the text to Code changes, and the language of each firm's report is very different. I expect to see the following relations between each independent variable and firms' compliance levels: Having a Big Four auditor leads to early compliance, the longer a company has been public, the more likely it will have complied early, international affiliations promote early compliance, and certain industries are more concerned with early compliance than others.

Poster # 180

### **Troubled Asset Relief Program: Impact as seen in the Agricultural Sector**

*Georgia Ralston*

Student's Department: Accounting

Faculty Mentor: James Chyz

My study is based on the paper "Does Access to External Finance Improve Productivity? Evidence from a Natural Experiment" by Alexander Butler and Jess Cornaggia. This study identified a causal effect that access to finance had on productivity during an exogenous shift of demand of corn, subsequent to the ethanol boom in twelve Midwestern states. My study will focus on how shocks in access to finance impact the relationships documented by Butler and Cornaggia. My research will use their empirical approach to capture differences before and after the financial crisis and the impacts of government capital infusions under the Troubled Asset Relief Program.

Poster # 181

### **Stock Market Reaction to Environmental Events**

*Liza Reineri*

Student's Department: Accounting

Faculty Mentor: Laura Cole

Environmental events impact a company's revenue and performance, and can also generate negative externalities on health and ecosystems. This paper will examine the stock market's reaction to negative environmental disasters that have occurred in recent decades, while also determining the extent of the market reaction by various event and industry.

Poster # 182

### **The Effects of International Experiences on Hiring Decisions**

*Robert Porter*

Student's Department: Accounting/Information Mgmt

Faculty Mentor: Kathy Wood

We're told as college students that having international experience can set us apart in the workplace, and we're encouraged to study abroad while still in college. I can attest that gaining international experience is a great deal of fun, but do companies really place value on this unique feature when hiring college graduates? In a rapidly globalizing economy, international assignments are growing, and the necessity for employees to take on those roles is growing as well. How do companies and industries take international skills into consideration when hiring recent college grads?

Poster # 183

### **How and When Matters: An In-depth Look at Tennessee CPAs Perceptions of International Accounting**

*Jordan Tipton*

Student's Department: Accounting/Information Mgmt

Faculty Mentor: Jan Williams

The purpose of my research project is to determine if a connection exists between Tennessee accounting professionals' educational and professional experience (including size of firm and years practiced), and their perceptions and acceptance of several key international accounting issues including the convergence of US GAAP and IFRS (international accounting standards). I hope to determine there is a positive relationship in regards to the level of

education (Bachelors', Master's, etc.) and type of firm (Big 4, regional, local, etc.) and perception of international accounting. I also believe there will be a negative relationship in regard to the degree of professional experience (number of years practiced) and acceptance of these international accounting issues. I plan to determine these findings with professional and educational experience as the independent variables and the degree of acceptance and perception as the dependent variables within my study.

Poster # 184

### **The Evolution and Consequential Actions of Data Breaches**

*Jillian Valk*

Student's Department: Accounting/Information Mgmt

Faculty Mentor: Anita Hollander

The advances in technology has made data loss a very common and unpredictable event. A data breach affects not only the company but other stakeholders as well. Millions of customer have had financial and personal data abused because of the breaches and, companies experience loss of reputation, proprietary/private information, and financial losses. Companies need to protect their data by being prepared for such events. This study gives holistic view of the trend in data breaches and the types of actions that are being conducting to combat breaches. By identifying the trend in data breaches it will allow others to see what types of breaches are most common and how frequent and impactful they have become. In addition, the second aspect of the study focuses on those types of actions that companies have taken and whether or not they have progressed in the same manner that data breaches have. The results from this part of the study combined with the first part aids in not only being proactive in technology but shows what types of actions have been adopted most and whether companies continue to improve their technology.

Poster # 185

### **The Founder Effect**

*Joseph Young*

Student's Department: Accounting/Information Mgmt

Faculty Mentor: Phillip Daves

Entrepreneurs are a unique breed of vision and daring. They shape the way our world works and mold how it develops in the future. My research looks into how a company performs with their founder as CEO in comparison to how other companies perform without their CEO.

Poster # 186

### **Corporate Community Engagement and Employee Commitment**

*Luke Dyson*

Student's Department: Business Administration

Faculty Mentor: Kathy Wood

My proposed thesis topic is looking into the effect that volunteering or socially responsible policies within corporations have on employee morale, employee retention, productivity, and the bottom line. This topic is increasingly looked into in today's business world and many companies are starting to integrate socially responsible policies into the core of their business. My thesis will be looking into whether the investments made by companies to promote social responsibility and volunteerism amongst its workforce pays off in the long run for the company itself. One of the main situations I will be looking into will be the difference between companies that promote socially responsible opportunities for employees vs. those that actually pay or provide incentives for employees to engage in the community and volunteer. To gather my pool of subjects, I will use companies I or my family have worked for or have connections to, as well as connections that my advisor, Kathy Wood, has. I will compare mission statements, send out employee surveys, and gather company data in order to obtain results on this topic.

Poster # 187

**Finding Phelps***John Ridley*

Student's Department: Business Analytics/Statistics

Faculty Mentor: Kenneth Gilbert

The collegiate sports teams are only allocated a certain amount of scholarships and within each school the number allocated to specific sports differs as long as the same amount are awarded to females as males. Our objective is to find the way to maximize success of the recipient per scholarship dollar. By looking at a recruit's swim times, we would like to be able to best predict their performance at the collegiate level. I am going to evaluate where swimmers are on their swim life cycle by building a growth cycle model that can be used to best predict whether or not a recruit has already peaked or still has a lot of room left for improvement. This is the beginning of what has the potential to be a very beneficial system.

Poster # 188

**Political Polarization***Jacob Clabo*

Student's Department: Economics

Faculty Mentor: Benjamin Compton

In recent years, there has been an increase in public perception that the American political process has become dramatically polarized. This perception has been fueled by well publicized filibusters and the constant threat of a government shutdown. It is the purpose of this thesis to explore the existence of this perceived polarization and to attempt and quantify the extent of this polarization.

Poster # 189

**To Give or To Teach***Carly Frensley*

Student's Department: Economics

Faculty Mentor: Phillip Daves

My thesis is focused on establishing a business model to alleviate poverty. It evaluates whether or not Official Development Assistance or Official Aid Received is an affective way to alleviate poverty. Then goes in to structures that can offer a way to fix the disconnect between aid and reduction in poverty.

Poster # 190

**A Hedonic Study on the cumulative impact of wind turbines on real estate prices***Sophie Henssler*

Student's Department: Economics

Faculty Mentor: James Holladay

According to the Department of Energy, the United States is one of the fastest growing wind markets in the world. Wind is a sustainable, clean, and cost effective energy source and the U.S. Department of Energy has introduced a Wind Program, which has set a target that in 2030, 20% of the nation's electricity will be produced by wind turbines (US Department of Energy). Yet as promising as it may be for the environment and for the United States, many critics say that it has negative impacts. Some argue that it conflicts with the country side and home owners claim that wind turbines decrease their real estate value. This study will further address the home owners concerns; however, as several larger studies have already been completed I decided to focus on whether an additional amount of capacity added to a wind turbine has an impact on real estate values. This was mentioned as further research in Hoen et. al research in 2010.

Poster # 191

**Economic Impact of Mega-Sporting Events: Explaining population effects on host cities**

*Samuel Rule*

Student's Department: Economics

Faculty Mentor: James Holladay

The economic impact of hosting a mega-sporting event has experienced ambiguous results in the past. Many have researched and analyzed the costs and benefits of hosting such an event, but little has been done to evaluate generalized economic impact on the city level. This paper analyzes whether hosting a mega-sporting event has an impact on a host city's population growth. My research asks the question: Does the international recognition of hosting a mega-sporting event have a long-term impact on a host city's population growth? The analysis focuses on sustained population impact rather than temporary tourism movements.

Poster # 192

**Dividends and their Determinants: An empirical study of manufacturing companies**

*Alexander Henke*

Student's Department: Finance

Faculty Mentor: Larry Fauver

Dividend determinants are a popular topic of study in financial research. Numerous papers have looked into what affects payout ratio and all have come up with varying results. One paper found that dividend policy for US firms was a function of profit margin, sales growth and D/E ratio, while another study in Pakistan found that it was a function of P/E ratio, EPS growth, and sales growth. This paper seeks to explore the dividend determinants of manufacturing companies in: the US, Brazil, Germany, China, South Korea, and Japan. I will be measuring the differences using a variety of factors including: profitability, cash flow, tax rate, sales growth, market-to-book ratio, debt ratio, P/E ratio, and EPS growth.

Poster # 193

**Travel Application Business Plan**

*Dania Li*

Student's Department: Finance

Faculty Mentor: Lynn Youngs

I am designing a business plan for a aggregate travel application. My presentation will detail the general business model and what I hope to achieve. This will be for the Global Leadership Scholars senior thesis project.

Poster # 194

**"Benedict Arnold" Corporations**

*Andrew Trapnell*

Student's Department: Finance

Faculty Mentor: Tracie Woidtke

U.S. corporate income tax rates are among the highest in the world and dissimilar from most countries, the U.S. additionally taxes the foreign profits of its Multinational Enterprises (MNEs). In the previous three decades a number of U.S.- based MNEs seeking to evade these costs and difficulties moved their corporate headquarters overseas through "corporate inversions." In response, the U.S. Congress has enacted several pieces of legislation designed to impede this activity. The laws have substantially shifted the corporate expatriation landscape for all involved parties; nevertheless, firms are continuing to pursue moving their headquarters abroad. My research analyzes various developments related to the U.S. Corporate Tax system, evidence of profit shifting behavior, corporate inversions and approaches for U.S.- based MNEs to still escape U.S. international tax laws.

Poster # 195

**Women and Wage Gap***Caitlin Burchette*

Student's Department: Management

Faculty Mentor: Debbie Mackey

Throughout history, women have made substantially less than their male counterparts. With women now making up a large proportion of the workforce, the equality levels between men and women should be on the rise. This research will discuss the history of the wage gap between male and female coworkers. It will also analyze the median salaries of male and females in the workforce to see if we are still making progress with closing the wage gap or if we have reached a plateau.

Poster # 196

**Books or Knives? - The Proof is in the Pudding***Rickey Dandridge*

Student's Department: Management

Faculty Mentor: Anne Smith

The primary objective of this study is to further research of managerial demographic factors (more directly the influence of entrepreneurial aptitude) on the success of restaurants. Entrepreneurial aptitude is defined as the necessary business acumen to understand the intricacies of marketing, accounting, finance, legal matters, human resources, etc. (Parsa, 2011, p. 10.) Success for this study is measured on a two factor base: financial outlook and organizational effectiveness. This research uses interviews of current restaurateurs during data collection. Past research had focused a great deal on identifying the factors that contribute to restaurant performance and correlations thereof. However, little has been done to understand how restaurateurs operationalize these factors and use them to leverage survival and ultimately superior performance. Restaurant failure researchers have stated that "further research should focus on these factors [clarity of business concept, marketing concepts, human resource management, financial management, family/life balance] that have been found to be the most critical to restaurant survival" (Parsa, 2005, pp. 319-320). This study will identify how restaurateurs leverage their education (specifically business education, if applicable) to manage challenges in their restaurant(s).

Poster # 197

**Going Viral: A Look Into the Effectiveness of Viral Advertising***Ashton Banta*

Student's Department: Marketing/Supply Chain Mgt

Faculty Mentor: Debbie Mackey

Social media websites have seen an explosion of growth over the last several years, and, with that, has come a new form of online advertising and marketing. It's called "going viral" and it involves developing a funny or especially memorable video or photo that generates an enormous amount of views and shares through various online communities. But while we often see these popular advertisements again and again, we rarely hear if they actually result in a rise in sales for the products or services they are promoting. The purpose of this project is to interpret the effectiveness of 'going viral' by comparing number of views and shares an advertisement receives by any increases in sales the products saw after the release. It will also aim to compare the most effective and least effective viral advertising campaigns in order for marketing managers to more fully understand which tactics work best.

Poster # 198

**Groupon or Groupoff?***Sarah Bishop*

Student's Department: Marketing/Supply Chain Mgt

Faculty Mentor: Stephanie Noble

Groupon has been an internet sensation, focusing on daily-deals to customers by offering deep discounts. The

company concentrates on discount offers in salons, restaurants, shows, services, and much more. Groupon, whose name blends “group” and “coupon,” came up with the idea of offering discounted deals in 2008. Since then, Groupon is the most-visited coupon website in the United States with approximately 30 million unique monthly visitors, and accounts for 59.1 percent of the U.S. daily deal market (Statista). Many merchants use Groupon in order to grow their customer base. By using Groupon, small businesses are able to reach customers they may not normally be able to market to due to lack of resources. Groupon is a cheap and effective way for businesses to get their name out to the local community and increase business traffic. Using insights from over 20 interviews of local businesses owners and consumers of Groupon, my study focuses on factors that could harm a small business using Groupon, and finds under what circumstances a business is most successful utilizing Groupon services.

Poster # 199

### **Corporate Social Responsibility: What is it, and Why Does it Matter?**

*Charles Currey*

Student’s Department: Marketing/Supply Chain Mgt

Faculty Mentor: Diane Mollenkopf

In an increasingly competitive business environment, employers are also competing to attract the right talent. Many of these employers are also promoting their company’s corporate social responsibility (CSR) efforts and achievements. This study sought to understand if such efforts affected their ability to attract young talent. Gaining an understanding of what job attributes are most important to graduating college students and how CSR impacts their decisions to work for a particular company is important for recruiters in attracting the right talent. To achieve this understanding and insight, I used a quasi-experimental survey methodology to conduct my research. Survey participants were randomly given a hypothetical job offer scenario with varying CSR and salary dimensions. My survey was distributed to undergraduate business students. Results from the survey suggest that CSR does, in fact, influence job offer acceptance decisions. There was a higher mean score for the likelihood of accepting a job offer from a company that demonstrated a commitment to CSR despite a lower salary offering compared to a job offer with little indication of CSR and a higher salary offering.

Poster # 200

### **Customer Perception of Product Recalls**

*Sydney Eiler*

Student’s Department: Marketing/Supply Chain Mgt

Faculty Mentor: Chad Autry

In previous research on the topic of product recalls, all recalls were seen as equal until the publication of “Resource Gaps and Resource Orchestration Shortfalls in Supply Chain Management: The Case of Product Recalls” by David J. Ketchen Jr., Kaitlin D. Wowak, and Christopher W. Craighead. In this paper, the authors explore the idea that no two recalls are the same. They proceed to break up product recalls into four types: precise, overkill, cascading, and incomplete. Based on these principles, my goal is to explore customer perception of each of the four recall categories to determine the overall effects each type has on consumers.

Poster # 201

### **Oh the Places You’ll Go: A Study on Job Acceptance Attributes**

*Heidi Faust*

Student’s Department: Marketing/Supply Chain Mgt

Faculty Mentor: Diane Mollenkopf

Willingness to relocate becomes a critical factor when companies begin their search for the right talent to fill the

positions they have available. Will the talent they want be willing to leave home? How far are they willing to go? Will students set aside the perfect job to stay close to home? My goal in this research project is to explore the success of current executives to find trends relative to relocation. I aim to discover if there is a soft correlation between the number of position changes and moves a top level employee has had and their overall success.

Poster # 202

### **Do Marketing and Advertising Expenditures Lead to Financial Success?**

*Christian Henson*

Student's Department: Marketing/Supply Chain Mgt

Faculty Mentor: Mark Moon

There is often strong tension between the marketing and financial managers of companies. Due to a lack of trust, communication, and knowledge, it was very difficult to accurately measure the return on investment for a given firm's marketing and advertising campaigns. In addition to this, it is difficult to measure the impact of every touch point a brand has on consumers. These factors causes frustration on both sides because marketing budgets are allocated without using concrete data, and financiers cannot always see the value of advertising. With this study, I will analyze the impact that marketing budgets have on financial success for fifty of the top 100 advertisers in the United States over a period of five years. This study will further investigate the role marketing and advertising play in creating value for shareholders.

Poster # 203

### **Mindset Manifestation: How an Environmentally Conscious Mindset Permeates an Organization**

*Alexander Speed*

Student's Department: Marketing/Supply Chain Mgt

Faculty Mentor: Diane Mollenkopf

This thesis project is being done as a requirement for the GLS program at UT. The thesis takes a look at company's who have adopted an environmentally friendly mindset and what effects that mindset has on the employees of the organization. Furthermore, it takes a look at company performance at times prior to and after the adoption of the mindset.

## **College of Communication and Information**

Poster # 10

### **The Merry Death Collector**

*Benjamin Murphy*

Student's Department: Journalism/Electronic Media

Faculty Mentor: Paul Harrill

Documentary filmmaking puts life on lens and who knows what the outcome will be. The creative team chose Arnie Meredith to be the subject of the short documentary The Merry Death Collector. The oddball LaFollette, Tennessee resident collects and sells antique items from estate sales and recently purchased two buildings to house and run his business. The story follows Arnie's struggle to open and maintain a small-town business. He attends a convention in Knoxville, Tennessee to raise funds, and even attempts to hang a biplane in one of his buildings. With his projected opening date around the corner, an exhausted Arnie finds himself two weeks behind schedule. The journey to his opening was a late one but one of true community support. The Merry Death Collector will make its official World Premiere at the Nashville Film Festival in late April. This Academy-Award qualifying film festival is the oldest running festival in the South and accepts only 6% of its over 3500 entrees.

Poster # 26

### **Recruiting Millennials: How UT Can Leverage Recruitment Efforts Among Out-of-State Students During a Period of Education Reform**

*Kristin Knight, Kevin Brown*

Student's Department: Advertising/Public Relations

Faculty Mentor: Lisa Fall

The Tennessee Promise scholarship program, which awards two years of free tuition to Tennessee community colleges, will change the way four-year institutions, including the University of Tennessee, recruit students. For financial reasons, many in-state students who would have enrolled at UT their freshmen year may now decide to obtain an associate's degree before attending a four-year university. UT has an opportunity to tap in to out-of-state audiences in order to propel application rates. Public relations students interviewed six out-of-state students and collected nearly 800 survey responses from current UT students, both in-state and out-of-state. The research team gathered information about current student's positive affectivity, commitment, positive word of mouth, trust, satisfaction, and engagement with the university. The results indicate that out-of-state students generally have a better attitude towards their experience at UT than in-state students. Through these findings, the research team developed four recommendations for UT Admissions.

### **College of Education, Health, and Human Sciences**

Poster # 204

#### **Parental Ethnotheories about Child Rearing among the Gamo People in Ethiopia**

*Hayley Moran*

Student's Department: Child and Family Studies

Faculty Mentor: Hillary Fouts

In all regions of the world, parents have specific ideas and beliefs about how small children should be cared for (Bornstein, 1989; Munro, 1975; Pomerleau, Malcuit, & Sabatier, 1991; Shweder et al., 1998). These ideas, often referred to as ethnotheories, are typically shared among a cultural group and can reflect culturally constructed ideas (Super & Harkness, 1996). Parental ethnotheories can be explored in a variety of theoretical frameworks. For this study, the developmental niche (Super & Harkness, 1992a; Super & Harkness, 1986a) was applied to delineate the ethnotheories of parents in the highlands of Ethiopia into three categories: 1) young children's physical environment, 2) cultural practices of child rearing, and 3) parental beliefs about parenting and young children's development. Parental ethnotheories were identified from semi-structured interviews with Gamo mothers (n=22) and fathers (n=20) in Southern Ethiopia. Using a constant comparative method (Corbin 2008), themes were identified and organized into the developmental niche framework to provide a portrait of parental ethnotheories among the Gamo. These patterns are discussed in light of the theoretical framework and implications for future research and intervention.

Poster # 205

#### **Effects of altered surface inclinations on knee kinematics during drop landing**

*Cicily Hummer, Antonio Schefano*

Student's Department: Kinesiology/Recreat/Sport St

Faculty Mentor: Songning Zhang

Lateral ankle sprains are commonly caused by landing in an excessive inverted and plantarflexed position. But this landing motion has not been studied for its effects on the knee joint. Therefore, the purpose of this study was to examine effects of landing surface inclinations on knee kinematics during drop landing. Twelve recreational athletes performed five drop landings from an overhead bar of 30 cm height on to three different surfaces: a flat surface, a 25° inversion surface, and a combined surface of 25° inversion and 25° plantarflexion. Three-dimensional kinematic data was collected using a nine-camera Vicon system. Selected knee kinematic variables were assessed by using a one-way

repeated measure analysis of variance (ANOVA,  $p < 0.05$ ). Landing on the combined surface displayed significantly less knee flexion range of motion (ROM) ( $-44.7^\circ$ ) compared to the flat surface ( $-51.3^\circ$ ) and thus likely incurred more knee joint reaction force due to stiffness in the joint. Landing with decreased knee flexion and increased knee abduction ROM may predispose the anterior cruciate ligament (ACL) to larger strains thus increasing the risk of ACL injury.

Poster # 206

### **3,4,4'-Trichlorocarbanilide Exposure Induces Gut Microbial Dysbiosis in Weaned Rats**

*Russell Fling*

Student's Department: Microbiology

Faculty Mentor: Jiangang Chen

Widely used as an antimicrobial in bar soaps, triclocarban (3,4,4'-trichlorocarbanilide; TCC) shows greater efficacy against gram positive bacteria than gram negative bacteria. This dichotomy may lead to overgrowth of bacterial populations less susceptible to the action of TCC. Sprague-Dawley (SD) rats were exposed to TCC (at 0.2% or 0.5% w/w) for 4 weeks starting on postnatal day (PND) 22 through the chow, followed by a washout period of 4 weeks without exposure. Same age SD rats served as sham controls without TCC exposure during the whole study period. Baseline samples were collected on PND 21 prior to the TCC exposure and collected weekly. Genomic DNA was extracted followed by PCR with barcode labeled primers targeting the v4 region of 16S rDNA. The barcode labeled PCR products were sequenced on the MiSeq platform. TCC exposure significantly altered GI tract microbiota composition, which was revealed by a dose-dependent overall bacterial community richness (ADONIS;  $p \leq 0.001$ ). This perturbation was noticeable as early as two days post-treatment with approximately 16.5–18.6% of OTUs significantly enriched ( $p \leq 0.05$ ) and continued throughout study period. At the community-level, TCC withdrawal produced a gradual return of microbial diversity to a pre-treatment state in the 0.2% w/w group, but not .5% w/w group as assessed by weighted Unifrac distance metric. Collectively, these data highlight the present and long term impacts of early life TCC exposure on gut microbial ecology and imply the potential niche for opportunistic pathogen growth due to alteration of microbiota composition by antimicrobials.

Poster # 207

### **The Bean Interview**

*Chelsea Lessard*

Student's Department: Nutrition

Faculty Mentor: Sarah Colby

With rising health care costs associated with high rates of obesity-related illnesses, health and nutrition are important areas for research and intervention. Beans are an example of an inexpensive, protein-rich, and high-fiber food often under-consumed by the general public. In addition, beans offer environmental advantages over meat sources of protein. In order to develop interventions that promote the benefits of beans to college students, a 15 question interview was conducted to determine the knowledge, attitudes, and behaviors college students have regarding beans. College students ( $n=30$ ) from various backgrounds and disciplines, aged 18 to 29, participated in the interview. Questions such as, "how many beans can you name?" and "why do you eat beans?" were asked. The study found 13% of students could not name one type of bean, and 28% of students felt beans were unavailable on campus. This interview is a subset of the "Get Fruved" research study, a social marketing campaign promoting healthy behaviors in young adults. The findings from this study will help provide insight as to what college students think about beans, and to understand where to focus interventions seeking to promote bean intake.

Poster # 208

**A study of infant feeding beliefs and behaviors among a sample of Southwestern Chinese mother-infant dyads***Maria Mejia*

Student's Department: Nutrition

Faculty Mentor: Katie Kavanagh

Despite the high breastfeeding initiation rate in China, rates of exclusivity and duration have recently declined. Infant formula, increasingly popular in China, is known to negatively impact breastfeeding rates, possibly via intention. The study objective was to conduct secondary data analysis exploring intended breastfeeding duration and factors associated with it, including prenatal purchase of infant formula and identification of the most influential person in regards to breastfeeding. In total 341 mothers, with infants <1 year of age, were recruited from a well-baby clinic. The sample was primarily of Han ethnicity (98.5%), primiparous (90%), and had initiated breastfeeding (95%). About half (51.8%) reported purchasing infant formula prenatally. Mothers indicating a specific duration of planned breastfeeding (n=272), were categorized into those planning to breastfeed for < 6 (71.7%) or > 6 (28.3%) months. Mothers planning to breastfeed for > 6 months were significantly less likely to report purchasing formula prenatally (37.4%), compared to those planning to breastfeed for <6 months (62.6%) (p=0.001). Regardless of planned duration, elderly individuals and the mothers themselves were considered to be important in the decision to breastfeed. Results showed that prenatal infant formula purchasing and planned breastfeeding duration may be important areas of future work. Dr. Zixin Lou, postdoctoral researcher in Dr. Kavanagh's lab, worked with Ms. Mejia to conduct this secondary data analysis using a dataset from her dissertation. Therefore, we wish to acknowledge her role as co-mentor on this abstract.

Poster # 209

**Dynamics and Organization of Ter macrodomain in Escherichia coli***Cynthia Nkem*

Student's Department: Nutrition

Faculty Mentor: Jaan Mannik

The Escherichia coli chromosome is organized into regions called the macrodomains (MDs). Four macrodomains have been identified, the terminus (Ter) macrodomain being one of them. The Ter MD is organized by a nucleoid-associated protein termed MatP. MatP is assumed to be the link between distant sites of the Ter regions. The inactivation of MatP results in a less compacted DNA and an early segregation of the Ter macrodomain. In this research, we want to examine how cross-linking of Ter macrodomain affects large scale organization of E. coli chromosome and its segregation. To study these effects we use time-lapse fluorescence microscopy and quantitative image analysis on variety of mutant strains. We show that chromosomal compaction requires in addition to MatP protein also ZapA and ZapB proteins that link terminus regions to cell division proteins. Our research points out MatP, ZapA and ZapB are important factors that organize E. coli chromosome, and coordinate cell division and chromosome segregation in this bacterium.

Poster # 210

**Examining teacher's role in building community among culturally diverse children in a preschool classroom***Sarah Maylott*

Student's Department: Psychology

Faculty Mentor: Carin Neitzel

Increasing cultural and ethnic diversity in the United States introduces a unique set of challenges for the development of preschool classroom peer communities as well as individual statuses of preschool children. A pilot project in a diverse preschool setting, which led to the current study, found that immigrant children were less likely to be leaders of social groups and held a lower social status when compared to non-immigrant children. This early social development is a significant factor in predicting future social and academic success therefore, how social roles and rules

are established warrants attention. Examined in this study was the teacher's influence on social development of children in culturally diverse preschool classrooms, including the teacher's role in influencing the hierarchal peer structure. Thirty-nine, ethnically diverse 4 and 5 year olds were observed in preschool classrooms using the following measures: immigrant and non-immigrant child interactions with teacher, content of teacher talk, proximity of children to teacher, and teacher strategies for assisting child learning. There were significant differences between immigrant and non-immigrant children concerning experiences, interactions, and proximity to their preschool teachers. These findings have implications for teachers working in ethnically diverse childcare settings and will be discussed further in the poster.

## College of Engineering

Poster # 11

### Squeaver

*Cole Stonebrook, Mathew Frana, Samuel Tabor*

Student's Department: Biosystems Engineering/Soil Science

Faculty Mentor:

Overhanging limbs pose a threat to many homeowners with trees in their yard. If these limbs fall, property damage and personal injury are a major possibility. Currently the two methods used to cut and remove these limbs are hiring a tree service to use a boom truck to lift an arborist up to the limb or having a tree climber cut and lower the limb. Both methods are unsafe and expensive. Our design will be a tree-trimming device that can be rented from an equipment rental facility and operated by the homeowner. The machine will have the capability to extend a boom out to 75 feet to grab and cut limbs in small, manageable sections and safely lower them individually to the ground. Due to the scope of the overall machine, our project will be focusing on the cutting and lowering apparatus and its articulation at the end of the boom. We have constructed a functioning prototype to test the proof of concept. Our prototype was designed to grab, cut, and lower limb sections up to 12 inches in diameter weighing up to 125 lbs.

Poster # 21

### Low Power Boost Converter Optimization for Energy Harvesting

*Douglas Bouler, Jared Baxter*

Student's Department: Electrical Engr & Computer Sci

Faculty Mentor: Daniel Costinett

We present a method of optimization involving a low power boost converter for energy harvesting. Most electrical devices require higher voltages than can be produced by an energy harvesting device. Boost converters can be used to convert the low voltages produced by solar panels, antennas, or other energy harvesting devices into higher voltages that can be used to supply power to electrical devices. Electronic equipment such as pacemakers, watches, and microcontrollers which use extremely low power must have high-efficiency boost converters to prevent losses in this delicate system. We have created a method used to optimize the components of a boost converter in order to improve the efficiency of power transfer between the energy harvesting device and the electronic load. We also demonstrate the implementation of this technique by using a solar panel and a microcontroller to supply power to a battery, which in turn supplies power to an electric watch.

Poster # 22

### Guiding Modifications to Vertical Bridgman Growth Furnaces through Numerical Modeling

*Christopher Hobbs*

Student's Department: Material Science/Engineering

Faculty Mentor: Mariya Zhuravleva

Radiation detection for the purposes of homeland security and medical imaging calls for gamma-ray sensitive detection materials marked by low energy resolution (approaching 1% at 662 keV) and improved light yield (>50,000 ph/MeV). A number of promising metal halide compositions have been found to meet both criteria, yet these materials

often suffer from cracking and supercooling during growth due to low matrix symmetry and anisotropic thermal expansion. In order to develop a reliable procedure to synthesize single crystals of these materials at larger diameters (1" to 2"), the growth furnaces at our disposal must be augmented to optimize growth conditions. The compositions of interest are grown from the melt via the Bridgman-Stockbarger technique. Due to the time and resource-intensive nature of trial-and-error experimentation to improve crystal growth using this technique, predictive numerical modeling offers a cost-effective solution. CGSim<sup>®</sup> software was used to create a virtual model of a Mellen three-zone tube furnace. The thermal fields inherent in the furnace were investigated by aligning the model to experimental measurements. Temperature settings were altered by an iterative process to create the desired thermal gradient in the model. Insulating diaphragms and a copper heat sink were implemented and their geometries optimized to further engineer a sharpened gradient at the melt-solid interface and an isothermal condition during cooling. In this way, weeks of optimization were reduced to just a few days of modeling. As a result of this effort, a translucent and crack-free 15 mm  $\varnothing$  boule of CsCaI<sub>3</sub>:Eu 3% was successfully grown in the augmented furnace using a mesohyperthermal zone regime and a translation rate of 1 mm/hr.

Poster # 23

#### **Internal Combustion Engine Model Aircraft**

*Michael Hutton, Mitchell Woodward, Thanh Nguyen, Ilya Gofman, Brandon Rogers, Keith Ferrell, Thomas Maynard, Jeremy Quayle*

Student's Department: Engineering Science/Mechanics

Faculty Mentor: Robert Bond

The internal combustion engine model aircraft team has researched, designed, constructed, and testing a model aircraft originally built for the SAE Aero advanced class competition. The competition dictated strict requirements on the aircraft. These requirements ranged from weight restrictions and payload minimums to engine displacement and takeoff distance. After successfully completing all of the requirements, the teams are then scored and compared to one another in order to obtain a final winner. The SAE-given requirements for the competition were quite stringent. To begin, the internal combustion engine could have a displacement of no more than 0.46 cubic inches, which translate to roughly 1 horsepower of output. Further, the structure of the aircraft could weigh no more than 8 pounds without having a serious score penalty. Using that light structure, the aircraft must still carry a 15- pound static cargo and a 3-pound expellable cargo. The aircraft must use telemetry data in order to successfully hit a target on the ground from an altitude of 100 feet with the expellable cargo. Many hours of research had to be spent on gaining understanding of past successful aircraft and comparable full-size models. Further, the team had to research the best methods of building this aircraft within a given budget.

Poster # 24

#### **Design of a Mobile Shade Structure for Organic Dairy Cattle**

*Ellen Moore, William Barbour, Jay McMillan*

Student's Department: Biosystems Engr/Soil Science

Faculty Mentor: John Wilkerson

The U.S. organic dairy industry has experienced significant growth in recent years: over 10% growth annually since 2009 and 14.5% from 2010 to 2011; total market share is approximately 5% in the United States. The USDA places certain requirements on diary products that are certified organic, some of which are aimed at grazing practices. One challenge farmers must overcome to comply is keeping the cows in optimum conditions in a free-range grazing scenario; poor conditions such as excessive heat can decrease milk production and pose an economic burden on the dairy. The proposed system intends to control environmental conditions for free-range dairy cows with respect to temperature-humidity index, a measure of animal comfort and stress. Using a combination of evaporative cooling and a large shaded

area, this mobile system will monitor and control environmental parameters via actuation of its water sprinklers and fans. This intelligent control will continually react to present conditions and forecast data, with additional connectivity and manual control. The design is expected to maintain ideal conditions, through active cooling means, far better than passive methods such as shade trees within the field. In situ testing will validate this prediction via the on-board data collection.

Poster # 25

### **A Mobile Canoe-Mounted, Geo-referenced, 3-D Water Quality Analyzer**

*Alexandra Shpik, Anna Ness, Ryan Vernich*

Student's Department: Biosystems Engr/Soil Science

Faculty Mentor: Paul Ayers

Water quality analysis is vital to ensure the health of water sources, as well as identifying pollutants and modeling how they affect a river system. Current methods of collecting water samples consist of stationary samplers that measure changes in water quality at only one location over time. We have designed a mobile, canoe-mounted, water quality analyzing system that will enable researchers to efficiently collect a large number of water quality samples with an associated GPS location and depth for each data point. While the canoe travels in parallel swaths bank to bank, the unit will alternately collect samples from 3 different depths: 20, 10, and 2 ft. The system measures water quality in multiple cross sections to acquire an adequate representation of how water quality changes across and below the surface of a river. A pumping system with incorporated solenoid valves aboard the canoe conveys each water sample to a water quality sonde for analysis. The sonde is capable of analyzing a sample in-situ for five parameters: temperature, pH, dissolved oxygen, electrical conductivity, and turbidity. With the water quality values and geo-referenced locations, we can develop multiple three-dimensional value maps of a river, illustrating spatial distribution of water quality.

Poster # 27

### **Unveiling cardiac dynamics using a data-driven technique for eigenvalue estimation**

*Veronica Go*

Student's Department: Biochem/Cellular/Molecular Bio

Faculty Mentor: Xiaopeng Zhao

Cardiac alternans, a beat-to-beat alternation in action potential duration in cardiac cells, is a harbinger of ventricular fibrillation. Ventricular fibrillation is a fatal arrhythmia and leads to sudden cardiac arrest, which takes the lives of about 300,000 Americans each year. Alternans is characterized by an eigenvalue of the Jacobian of the beat-to-beat state-space function approaching -1. Unfortunately, specifying a model to fully describe cardiac dynamics may be impossible. Furthermore, the full state-space may not be physically measured. [6] developed statistical data-driven techniques to estimate dominant eigenvalues and their standard errors by measuring action potential duration values. This work expands the previous technique by introducing random disturbances to the pacing rate. The variances in disturbance improves the robustness of the technique, rendering it more suitable for experimental analyses, where noise and measurement errors impose challenges to data analysis.

Poster # 28

### **In vitro study of astrocyte response towards hydrogel particle modified silicon surface**

*Katie Rogers*

Student's Department: Biomedical Engineering

Faculty Mentor: Wei He

Brain-computer interfacing is a rising research area with the hope to treat patients with neurological disorders, such as epilepsy and Parkinson's disease, or paralysis. A key component of such technology is implantable neural electrode, which is used to capture neural signals to allow conversion into external commands. A challenge with these neural electrodes is poor neuron adhesion and the adverse effects induced by host reaction, e.g., the formation of glial

scar tissue around the implant. Studies have shown that scar tissue is caused by adhesion and proliferation of glial cells, especially astrocytes, toward the implant. This scar encapsulation greatly hinders further neuron-implant interaction. Recently, our lab has developed polymeric hydrogel particles (HPs) that readily adsorb to planar silicon surfaces, which is one of the common materials used in neural implants, and can support neuron adhesion and differentiation on the substrate. Yet, little is known regarding how astrocytes interact with such HP-modified silicon. Here we will present in vitro findings of astrocyte response with a focus on whether astrocyte attaches to such surfaces, and whether the adhesion can be modulated with the surface density of HPs. This research will guide our future effort to achieve neural-promoting and glial-suppressing surfaces using HPs.

Poster # 29

### **Neutron Imaging of Lithium Coolants Inside High Temperature Niobium Heat Pipes**

*Steven Barclay, Eric Martin*

Student's Department: Chemical and Biomolecular Engr

Faculty Mentor: Kenneth Kihm

High temperature, liquid metal heat pipes are passive, two-phase heat transfer devices. The heat pipes examined in this research have a Niobium shell and Lithium coolant on the inside. It is important to understand the characteristics of the Lithium inside the heat pipes before using them in practical applications. In order to better analyze the heat and mass transfer abilities of the lithium, neutron imaging was selected to enable viewing of its detailed flow patterns. Neutron radiography allows for visual inspection of the inner working fluid while pervading the heat pipe sample's outer shell. Tomographic imaging of the heat pipe sample at ambient conditions was completed at ORNL resulting in many individual projections. These projections were reconstructed at ORNL using their Octopus and VolView software. The reconstructed CT images allowed for visualization of the heat pipe's inside mesh wicking structure and Li distribution, giving understanding into structural workmanship that is critical for the pipe's working efficiency.

Poster # 30

### **Autocatalytic Activation of the Hemagglutinin in Influenza**

*Marti Bell*

Student's Department: Chemical and Biomolecular Engr

Faculty Mentor: Eric Boder

Influenza is a pathogenic virus with various human and avian subtypes. In influenza, there is hemagglutinin (HA), a membrane protein. HA sits on the surface of the virus in an inactive state with its fusion peptide embedded within the protein. Once the virus with the HA encounters a decrease in pH (within cellular endosomes), then the protein will go through an irreversible change in structure. A 20-amino acid "fusion peptide" sequence relocates and becomes exposed. Once this occurs, the viral and endosomal membranes fuse, allowing infection of the cell. If the dynamics and function of this virus-cell interaction can be understood, then it could be applied to the prevention of influenza infection and proliferation or could potentially be applied to drug or gene delivery using lipid vesicles. Funding provided by the RISER program and grant CBET-1264506 from the National Science Foundation.

Poster # 31

### **Adaptation and robustness in a chemotaxis network**

*Beini Chen*

Student's Department: Chemical and Biomolecular Engr

Faculty Mentor: Steven Abel

Adaptation is a behavior of biological systems in which a sustained change in input signal leads to a transient output response that returns to the pre-stimulated output level. Cells use adaptation to maintain sensitivity to the changes in their environment and to remain in homeostasis while the input signal is perturbed. Signaling networks in

both prokaryotic and eukaryotic cells demonstrate adaptation, which is a common feature of chemotaxis, a signal transduction process that enables cells to sense chemical gradients in their extracellular environment and to adjust their movement in response. In the case of *Escherichia coli*, the bacteria swim in random directions in the absence of a chemical gradient, but will move toward or away from the chemical when a gradient exists. In this study, we use computational methods to study adaptation in the chemotaxis network of *Escherichia coli*. Based on the well---characterized two---state model of Barkai and Leibler (Nature 1997), we numerically analyze the chemotactic network with ordinary differential equations and measure the adaptation time and precision of the response to a change in ligand concentration. The adaptation time is the time that the signal takes to reach steady---state after a perturbation in input, and precision measures the difference between output and input levels. We find that the network exhibits a sensitive response and precise adaptation to the input stimulus. We also analyze the robustness of the network by randomly varying the kinetic parameters and characterizing the change in behavior. The adaptation demonstrates robustness: although the adaptation time varies over a wide range, the precision is nearly perfect regardless of the values of the parameters. This shows that adaptation in this network depends more strongly on the topology of the network than on the values of kinetic parameters.

Poster # 32

### **Algorithm Optimization for the Rational Design of Modular Cells**

*David Conner*

Student's Department: Chemical and Biomolecular Engr

Faculty Mentor: Cong Trinh

When designing modular cells, it can be quite challenging to determine of the Common Deleted Reaction Set (CDRS) of several metabolic networks. The scope of this calculation increases exponentially with the number of networks and the differences between them. The original method used in calculating the CDRS was a brute force algorithm that checked reaction combinations one at a time to determine if at least one Minimal Deleted Reaction Set (MDRS) from each metabolic network was satisfied. By including preprocessing steps based on the frequency of appearance of reactions in each of the networks' MDRS and by implementing parallel computing, the overall time to compute, as well as number of combinations examined, was decreased by several orders of magnitude.

Poster # 33

### **SAE Aero Design Regular Class Challenge**

*Norma Miselem, Ryan Fulmer, Charles Bolen, Robert Cook, Alex Oakley, Matthew Long, John Bridges, Patrick Busch*

Student's Department: Mech/Aerospace/Biomed Engr

Faculty Mentor: Robert Bond

This year's SAE International Aero East Regular Class Competition involves the designing and building of an RC aircraft that can lift as much weight as possible within specific design parameters. This design presents an RC aircraft with the potential to carry a 4"x4"x10" payload of 25 pounds. It achieves this with a straight rectangular wing with a wing span of 96in and a chord of 15.6in. The fuselage, which will hold the cargo and propulsion systems for the aircraft, is 39in long and has a diameter of 6in. A 1.3 horsepower motor, powered by a 3000mah 6S 25-50C Lithium Polymer Pack and a 16"x8" propeller are used to propel this aircraft. With these components, the aircraft is predicted to fly at a steady level flight velocity of 140 ft/s and to achieve a takeoff distance of 96ft.

Poster # 34

### **Engineering the Oleaginous Yeast, *Yarrowia lipolytica*, for Optimal Utilization of Hemicellulosic Materials**

*Julie Hipp*

Student's Department: Chemical and Biomolecular Engr

Faculty Mentor: Cong Trinh

Utilization of plant biomass to produce fuels and valuable chemicals by biological means has become increasingly relevant as the push for the use of renewable energy resources has increased. D-xylose, one of the most

abundant sugars in lignocellulosic biomass, has been the subject of many studies due to its utilization being affected by other sugars of high concentration in biomass substrates, namely D-glucose and D-mannose, and the enzymatic pathways for xylose breakdown having low levels of function in many organisms. The goal of this study is to investigate and optimize sole xylose utilization in the oleaginous yeast, *Yarrowia lipolytica*. It has been seen that growth on xylose over several generations can create an increase in xylose uptake and cell growth. By adapting cells to a xylose environment and by manipulating the organism's enzyme expression levels, xylose utilization can be greatly improved, resulting in a strain that can more efficiently utilize lignocellulosic biomass. In this study, various techniques were used to determine bottlenecks in the xylose utilization pathway in *Y. lipolytica* and steps were taken to fix these bottlenecks and furthermore increase xylose utilization.

Poster # 35

### **Optimization of Fission Yeast Lipogenesis for Increased Biofuel Production**

*Taylor Weiskittel*

Student's Department: Chemical and Biomolecular Engr

Faculty Mentor: Paul Dalhaimer

The feasibility of biofuels as an efficient source of energy relies heavily on the capability of biosynthetic organisms to produce metabolites needed for biofuel production at a high yield. To date, the utilization of fission yeast as a biodiesel producing platform has yet to be fully investigated, so here we genetically engineered *S. pombe*, to achieve higher capacities of de novo lipogenesis, specifically triacylglycerols (TAG), one of the main precursors to biofuels. The genetic targets for this work are *dga1*, *acc1*, and *are2*. *Dga1* and *Acc1* are heavily involved in the synthesis of lipids and are overexpressed with the *P3nmt1* promoter in mutated strains. Because *Acc1p* is also involved in the production of sterol esters which is not optimal for biosynthetic fuel production, we deleted *are2*, which catalyzes the ultimate step of sterol ester synthesis, thus redirecting precursor molecules towards further TAG production.

Poster # 37

### **Charge Transport in Imidazole-based Deep Eutectic Mixtures**

*Logan Terheggen*

Student's Department: Chemical Engineering

Faculty Mentor: Joshua Sangoro

Deep Eutectic Mixtures of levulinic acid with a series of imidazoles are measured by broadband dielectric spectroscopy and differential scanning calorimetry to investigate the impact of alkyl substitutions on charge transport. An increase in conductivity is observed in each of the imidazoles upon addition of levulinic acid. However, the extent of increase is dependent upon the alkyl substitution on the imidazole ring. These results highlight the important of molecular structure on hydrogen bonding and charge transport in deep eutectic mixtures.

Poster # 38

### **Dominance of Methanosepta populations at high acetate concentrations during unstable anaerobic digestion**

*Marcelle Vilela Martins Lipman*

Student's Department: Chemical Engineering

Faculty Mentor: Qiang He

Anaerobic digestion has received increasing attention because of its techno-economic viability and environmental sustainability. This process generates biogas and preserves the nutrients that could be recycled back to the agricultural land in the form of slurry or fertilizer. The importance of biogas technology lies in the fact that it makes the best utilization of organic wastes as a renewable source of clean energy. The main issue of this process though is the potential process instability resulting probably from methanogenic microbial populations' changes in the process

conditions when acetate accumulate as an intermediate. In order to achieve the process stability, the objective of this study was to identify methanogenic populations sensitive to acetate fluctuations. Animal waste was fed in continuous anaerobic digesters at 35°C, all digesters exhibited stable operation with consistent pH, methane yield, and acetate level consistent with the substrate loading rate. In order to analyze methanogenic populations' competition, substrates such as ethanol and acetate were added in triplicate continuous anaerobic digesters to stimulate methane production. Ongoing efforts are focused on molecular and metagenomics analysis of the micro populations responsible for enhanced methane production.

Poster # 39

### **Timescale of Clay-Polymer Composite Response Using Expansion Index Test**

*Jordan Hicks*

Student's Department: Civil and Environmental Engr

Faculty Mentor: Angel Palomino

The purpose of this work is to quantify the amount of time for clay-polymer composites to respond to changes in the surrounding pore fluid conditions. The most critical physical property of the clay-polymer composites is the ability to expand or contract in response to some change in the surrounding fluid pH or ionic concentration. Understanding the timescale at which this response occurs is necessary for estimating the material response at the field scale. The materials used to create the composite are kaolinite clay and low molecular weight polyacrylamide polymer. Specimen response was determined using an expansion index consolidometer. The change in specimen height with time was monitored for a period of at least two weeks. Preliminary results show that low pH pore fluid conditions cause the clay-polymer composite to expand, while high pH pore fluid conditions cause the composite to contract. Negligible change of the composite occurs when distilled water or very low ionic concentration solutions are used.

Poster # 40

### **Quantifying Extracellular Enzyme Activity In Deep-Sea Sediment From the Mediterranean Sea Through The Use Of Fluorometric Assays**

*Shane Hagen*

Student's Department: Civil Engineering

Faculty Mentor: Terry Hazen

The Mediterranean Sea is home to a diverse community of heterotrophic microbes responsible for cycling much of the organic carbon that enters its waters. The subset of those organisms that utilize macromolecules produce extracellular enzymes as a means of carbon degradation. However, this hydrolytic community is poorly characterized at water column depths greater than a few hundred meters where physical properties, such as pressure and temperature, create a unique environment for influencing enzyme behavior. Here we describe enzyme activities of a suite of hydrolases in surface sediment collected at four sampling stations in the Mediterranean Sea at water depths ranging from 800-2200m. In total, nine enzymes were studied- three peptidases, one esterase, and five glycosidases. Fluorometric assays revealed alkaline phosphatase and aminopeptidase to be active on the magnitude of 100x the other enzymes studied here. Furthermore, assays revealed a significant correlation between activity and depth for a majority of the studied community, indicating adaptation to environmental conditions. A qualitative assessment of the data also showed difference in the activity of enzymes from cores taken from the same site, suggesting variability in hydrolytic potential over a short (approximately 1 m) spatial scale.

Poster # 41

**Explicit Integration with GPU Acceleration for Large Kinetic Networks***Benjamin Brock*

Student's Department: Computer Science

Faculty Mentor: Michael Guidry

We demonstrate the first implementation of recently-developed fast explicit kinetic integration algorithms on modern graphics processing unit (GPU) accelerators. Taking as a generic test case a Type Ia supernova explosion with an extremely stiff thermonuclear network having 150 isotopic species and 1604 reactions coupled to hydrodynamics using operator splitting, we demonstrate the capability to solve of order 100 realistic kinetic networks in parallel in the same time that standard implicit methods can solve a single such network on a CPU. This orders-of-magnitude decrease in compute time for solving systems of realistic kinetic networks implies that important coupled, multiphysics problems in various scientific and technical fields that were intractable, or could be simulated only with highly schematic kinetic networks, are now computationally feasible.

Poster # 42

**Forward Error Correction for Fast Streaming with Open-Source Components***John Reynolds*

Student's Department: Computer Science

Faculty Mentor: James Plank

The mechanisms that provide streaming functionality are complex and far from perfect. Reliability in transmission depends upon the underlying protocols chosen for implementation. There are two main networking protocols for data transmission: TCP and UDP. TCP guarantees the arrival of data at the receiver, whereas UDP does not. Forward Error Correction is based on a technology called "erasure coding," and can be used to mitigate data loss experienced when using UDP. This paper describes in detail the development of a video streaming library making use of the UDP transport protocol in order to test and further explore network based Forward Error Correction erasure codes.

Poster # 43

**A Low Power Wireless Sleep Apnea Detection System Based on Pyroelectric Sensor***Natalie Beitel*

Student's Department: Electrical Engr &amp; Computer Sci

Faculty Mentor: Syed Islam

Sleep apnea affects millions of adults in the United States, and is even more prevalent in premature infants. A reliable apnea detection system is vital to neonatal care. This paper presents a complete low-power wireless sleep apnea detection system fabricated in a 0.5- $\mu\text{m}$  CMOS process. In the proposed system, a flexible pyroelectric transducer called Polyvinylidene Fluoride (PVDF) is attached beneath the nasal cavity of an infant to monitor the breathing pattern. The transducer produces a charge that is proportional to the heat generated from nasal air flow which is then converted to a voltage signal by a charge amplifier. The system then detects whether the signal is within a certain threshold which can be tuned to an infant's specific breathing pattern. A digital circuit then determines whether an abnormal breathing signal has been present for a period of ten seconds or more. If so, a detector generates and wirelessly transmits an impulse, otherwise the timing electronics are reset. With the exception of the transducer, signal processing unit, and the wireless interface, all electronic components are realized on a single CMOS integrated circuit. In future work, the system will implement the wireless transmission of the entire breathing signal for the analysis on the receiving end.

Poster # 44

**No Free Lunch Theorem: Comparing Black-box Algorithms***Phillip Goldfarb*

Student's Department: Electrical Engr &amp; Computer Sci

Faculty Mentor: Michael Vose

Black-box algorithms are a class of algorithms often used for function minimization. An example is a simple hill-descender, which attempts to find a low point on a function's graph by moving downhill. A hill-climber, which attempts to find a low point by moving uphill, is equally effective at locating a global minimum when effectiveness is judged by averaging performance over all functions. It seems paradoxical that moving in the wrong direction (uphill) should be on average just as effective as moving in the right direction (downhill) for function minimization. The no Free Lunch Theorem explains why that is the case, and in fact guarantees that the performance ensembles of Black-box algorithms are merely permutations of each other. Despite the guarantees ensured by the No Free Lunch Theorem, it may nevertheless happen that the relative performance of Black-box algorithm A with respect to Blackbox algorithm B differs from the relative performance of Black-box algorithm B with respect to Black-box algorithm A. This project explores that possibility by way of computer simulations.

Poster # 45

**Implantable Silicon/Cell Hybrid Biochips for Continuous and Autonomous Surveillance of Health Status***Maeve Lawniczak*

Student's Department: Electrical Engr &amp; Computer Sci

Faculty Mentor: Steven Ripp

Personalized medicine is an emerging medical technology that promises to tailor health care to the individual patient. To realize this potential, biosensors that integrate directly to the patient may be crucial toward the diagnosing, monitoring, and self-remedying of disease states. In this experiment, results of signals from bioluminescent cells are detected using an integrated circuit biochip and converted to a digital output. The biochip consists of a single photon avalanche diode (SPAD) that absorbs the wavelength energy of the photons released by the adhered cells and amplifies the electron gain so that the signal can be detected and measured. The integrated circuit biochips are designed for potential integration with human cell lines capable of emitting bioluminescent signals to indicate cell death or other deleterious conditions. The hypothesis of this project is that SPAD-based integrated circuit sensors, when appropriately paired with encapsulated human reporter cells, can function under conditions representative of animal implantation and are capable of rapidly and autonomously detecting changes in health status. Control experiments using bioluminescent bacterial cells indicate that the breadboard design of the SPAD is capable of capturing bioluminescent signals. The objective now is to begin interfacing bioluminescent human cell lines with the SPAD to achieve a digital output corresponding to a small photocurrent and to further refine this device to enable its full implantation into a rodent model.

Poster # 46

**Symmetric Extended Formulations of the Bin Packing Problem***Victoria Collier*

Student's Department: Industrial/Systems Engineering

Faculty Mentor: Jim Ostrowski

This research considers instances of the bin-packing problem where bin sizes are not identical. If bin sizes are identical, the classical integer programming formulation contains symmetry. As symmetric problems tend to be more difficult, it would be natural to think that packing instances without the symmetry caused by identical rooms would be computationally easier. However, this is not always the case. In this work, we show how to create a symmetric extended formulation of the bin-packing problem. If the range of the room sizes is relatively small compared to the item sizes,

there can be a computational advantage to solving the symmetric extended formulation instead of the classical (non-symmetric) formulation.

Poster # 47

### **Initial Investigation of Hot Pressed MgO and Mg<sub>2</sub>SiO<sub>4</sub>**

*James Brackett*

Student's Department: Material Science/Engineering

Faculty Mentor: Chris Wetteland

Polycrystalline olivine (Mg<sub>2</sub>SiO<sub>4</sub>) and magnesia (MgO) pellets were prepared using a newly acquired vacuum hot press for the purposes of investigating transient high flux protons in the early solar nebula. The hot press operates in a vacuum or argon atmosphere and is capable of pressing samples up to twenty-five tons with a maximum temperature of 2000°C. A hot press cycle requires considerable time for pumping, heating, and cooling; therefore, optimizing sintering schedules can improve daily production of pellets. In order to determine the ideal parameters for sintering olivine, a series of experiments were conducted to measure density as a function of sintering time, keeping pressure and temperature constant. The effectiveness of each dwell length (ramp and cooling rates kept constant) was assessed by measuring densities, phase identification with X-Ray diffraction, and analyzing microstructure and overall porosity using a scanning electron microscope (SEM). A direct relationship exists between sintering time and density, with SEM results indicating limited porosity in the 30 and 120 minute samples. Results indicate that an adequate density is achieved after a 30 minute dwell for the proposed irradiation experiments.

Poster # 48

### **In-Situ Investigation of Chemical Bath Deposition of CdS via Localized Surface Plasmon Resonance Spectroscopy**

*Connor Carr*

Student's Department: Material Science/Engineering

Faculty Mentor: Ramakrishnan Kalyanaraman

Chemical bath deposition (CBD) is an excellent way to cheaply deposit thin semiconductor films for use in photovoltaics. In order to improve the efficiency of the manufacturing process and to get a better control of the morphology of the deposited film, it is critical to understand the early-stage growth process in CBD. Here we have developed an in-situ technique based on measurements of the localized surface plasmon resonance (LSPR) shift of silver nanoparticles resulting from dynamic CBD of cadmium sulfide (CdS). By coupling in-situ measurements of a lateral shift in the location of the LSPR peak with ex-situ scanning electron microscopy (SEM) images of the morphology of the film, we have created a plasmonics-based effective medium model to explain the growth of CdS film by dynamic chemical bath deposition. This study not only allows us to optimize the film quality of CdS but also minimizes wastage that is commonly associated with such a deposition technique.

Poster # 49

### **Effects of Heat Treatment, Chemical Composition, and Cladding on the High Temperature Hydrogen Attack Resistance of C-½ Mo Steels**

*William Hoskins*

Student's Department: Material Science/Engineering

Faculty Mentor: Carl Lundin

Low-alloy steels are susceptible to High Temperature Hydrogen Attack (HTHA), which is a type of hydrogen damage where steels show degradation in mechanical properties resulting from surface decarburization, internal decarburization, and methane bubble formation, leading to fissuring by methane bubble coalescence. Metallurgical evaluation and high temperature, high pressure hydrogen exposure studies were conducted on ex-service C-1/2Mo steel samples to investigate the effect of heat treatments, chemical composition, and cladding on the resistance of C-1/2Mo

steel to HTHA. The effects of heat treatment and chemical composition on HTHA resistance were investigated by exposing specimens from two C-1/2Mo heats; from each heat, a normalized and tempered specimen and an annealed and tempered specimen were exposed to high temperature, high pressure hydrogen. To determine the effects of cladding with a ferritic stainless steel, a C-1/2Mo specimen was exposed to high temperature, high pressure hydrogen having both a clad side and an unclad side. Normalizing and tempering caused the formation of a finer dispersion of more stable carbides, which were more resistant to HTHA. A higher molybdenum-to-carbon ratio was found to increase resistance to hydrogen attack in C-1/2Mo Steel. A ferritic stainless steel clad significantly improved resistance to HTHA in C-1/2Mo steels.

Poster # 50

### **First Principles Investigation of Mechanisms of Peroxide Decomposition over Titanosilicate Catalysts**

*Jedidiah Long*

Student's Department: Material Science/Engineering

Faculty Mentor: David Keffer

Catalysts are a class of material that accelerate reaction rates and have ubiquitous effects on our lives—from the “cracking” of petroleum to gasoline to the removal of carbon dioxide and nitrogen oxides in the catalytic converters of every automobile sold in the US since 1975. Despite their importance, the development of new catalysts remains largely an empirical science because the inability to clearly understand the relationship between the atomic structure of the catalyst and the corresponding catalytic activity arises from an uncertainty regarding the transient structures formed on the picosecond timescale during the reactive process. The research presented here employs computational analysis to provide an unambiguous understanding of the ground states of the reactive complex, product complex and transition state for an archetypal reaction, namely the decomposition of peroxide over a titanosilicate. This computational approach can lead to a better understanding of the structure/property relationships in catalysts that, when communicated to synthesizers, has the potential to significantly reduce the development time of new nanostructured catalysts. This joint computational and experimental approach forms our strategy for predictable design and synthesis of new single-site catalysts. Several structural characteristics of titanosilicates are methodically varied in this work, including the connectivity of the titanium atom to the support matrix, the structural nature of the support and the rigidity of the support. These systems are chosen in close collaboration with experimental synthesizers so as to be able to both validate the computational model as well as to provide a mechanistic understanding for experimental observations of catalytic activity. Density Functional Theory will be used to solve Schrödinger's equation, describing the quantum mechanics of the system. A full analysis of the reaction pathway, including optimized geometries and corresponding energies are evaluated.

Poster # 51

### **Homogeneity and annealing study on CsSrBr<sub>3</sub>:Eu scintillator**

*Matt Loyd*

Student's Department: Material Science/Engineering

Faculty Mentor: Mariya Zhuravleva

Scintillator crystals used for radiation detection in homeland security applications require bulk size crystals. Therefore compositional and scintillation homogeneity is vital for obtaining an excellent energy resolution. CsSrBr<sub>3</sub>:Eu is very promising scintillator with a light output of 35,000 ph/MeV, an energy resolution of 4%, and a melting point of ~760°C. Single crystals of this ternary compound is grown via the Bridgman method from the molten mixture of binary halide raw materials, and therefore some compositional non-uniformity may exist in the crystal due to incomplete melt mixing. In this work, differential scanning calorimetry (DSC) was used to study phase homogeneity by comparing melting and crystallization temperatures in different sections of the crystal. In spite of the shown phase uniformity throughout

the boule, gamma spectroscopy measurements utilizing a  $^{137}\text{Cs}$  source revealed that  $\text{CsSrBr}_3\text{:Eu}$  had two energy peaks at 662 keV. The spectra were recorded with a crystal encapsulated in mineral oil to protect it from degradation. On the first day the gamma ray spectrum showed one peak at channel 285 and another at channel 450. After day 6 there was no evidence of peak position at channel 450. The packaged crystal was removed and annealed in vacuum at  $200^\circ\text{C}$  for 24 hours. This experiment showed that after annealing only the higher channel peak remained and light yield was increased by 48 %, when compared to the non-annealed piece. DSC analysis of sections of the  $\text{CsSrBr}_3\text{:Eu}$  boule as well as the packaged crystal showed homogeneity throughout, implying that the secondary peak is due to a non detectable defect that is removed through annealing. This work has been supported by the US Department of Homeland Security, Domestic Nuclear Detection Office, under grant # 2012-DN-077-ARI067-04. This support does not constitute an express or implied endorsement on the part of the Government.

Poster # 52

### Using Ab Initio Simulations to Examine the Flexoelectric Effect in Perovskites

*Austin Plymill*

Student's Department: Material Science/Engineering

Faculty Mentor: Haixuan Xu

Flexoelectricity is a property that dielectric materials exhibit where they produce polarization when subject to an inhomogeneous deformation. In the past, this effect has been largely ignored, as its effect in bulk materials has been much less significant than the related effect of piezoelectricity, the polarization of material due to uniform deformation. Interest in flexoelectricity has been increasing in recent years due to the development of nanotechnologies. Flexoelectricity is proportional to the strain gradient a material is subjected to making the flexoelectric effect immense on the nanoscale. Additionally, the flexoelectric effect scales with the dielectric constant making it have a significant effect in newly developed high permittivity materials such as ferroelectrics and relaxors. Applications being looked into for this phenomenon include improving the electro-mechanical response of piezoelectric materials as well as the creating of electro-mechanical sensors and actuators out of non-ferroelectric insulators. Research in this project includes using DFT simulations to determine the longitudinal flexoelectric coefficient, which is difficult to determine experimentally. This calculation was performed for several high permittivity perovskite compounds. Additionally, calculations of the flexoelectric coefficient using local density approximation functionals and generalized gradient approximation functionals are compared.

Poster # 53

### Elucidating Sex-Related Differences in Calcification of Rat Aortic Heart Valves

*Sara Parker, Jenny Patel*

Student's Department: Mech/Aerospace/Biomed Engr

Faculty Mentor: Zannatul Ferdous

Calcific Aortic Valve disease is a disorder that affects approximately 26% of the elderly population and is a major cause of heart valve failure. With this disease, calcium and mineral deposits accumulate on the aortic valve, leading to stiffening and narrowing of the valve itself. This reduces blood flow and increases blood pressure, which can result in the development of other cardiovascular diseases. Valve failure is typically treated via valve replacement surgery, a procedure that incurs an enormous cost and is accompanied by risks associated with open heart surgery. Many clinical studies have shown that Aortic Valve Stenosis is more common in the male population than female, suggesting that male sex is a risk factor for aortic valve disease. Furthermore, the existence of testosterone and estrogen receptors has been reported in cardiovascular cells. Binding of these hormone molecules to cell membrane receptors activates many pathways and triggers a cascade of events. However, there is limited knowledge on how sex of isolated valvular interstitial cells (VICs) affects the cellular and molecular events associated with calcific processes. We hypothesize that

male VICs will demonstrate greater calcific markers when cultured in calcifying conditions compared to female age-matched VICs isolated from rat aortic valves. To test this, VICs were isolated from the aortic valve of 2 female and 2 male rats. The cells were cultured in regular (control) and osteogenic media and samples were taken for further assessments after 10 and 20 days of culture. To measure the amount of calcification, Alizarin Red and Von Kossa staining were performed along with Alkaline Phosphatase enzyme (ALP) assay. Our data indicated that mineralization and presence of calcific markers has a positive correlation with exposure to osteogenic media and exposure time. This data suggests that male VICs experience greater calcification than female. Further research will investigate the mechanisms of cell calcification and the processes involved in cell death in order to improve our understanding of valve biology and calcification.

Poster # 54

### **Practical Applications of Laser Ignition**

*Cary Smith*

Student's Department: Mech/Aerospace/Biomed Engr

Faculty Mentor: Zhili Zhang

The presentation will cover research ongoing over the course of the Summer 2014, Fall 2014, and Spring 2015 semesters in applications of laser-induced ignition. Laser-induced ignition utilizes a laser shot to generate plasma in a fuel-air mixture, thus causing the mixture to combust. The research is sponsored by the United States Air Force Arnold Engineering Development Center (AEDC), and was undertaken in order to aid the development of a laser-induced ignition system for use in a high speed, high temperature wind tunnel system in which hypersonic air vehicle flight conditions are simulated. The presentation will detail the progress of research conducted at UT College of Engineering MABE Department's Laser Diagnostics Laboratory in the determination of the minimum ignition energy (MIE) input for multiple fuel types at variable fuel-air equivalence ratios and laser wavelengths.

Poster # 55

### **Development of a Radioisotope Identification Algorithm for Gamma Spectra with a Low Energy Signal-to-noise Ratio**

*James Ghawaly*

Student's Department: Nuclear Engineering

Faculty Mentor: Howard Hall

Radioisotope identification algorithms (RIID) are highly important to the nuclear industry, particularly in the area of detection, for forensics, broad area detection, and sealed container evaluation. These algorithms provide a method to identify radioisotopes by reducing manual analysis of spectral data. Conventional RIID algorithms for gamma spectra generally come as part of gamma-ray detector software packages (e.g. Maestro, Genie 2K, etc) that are expensive, limited operation functionality, and are very reliant on the preset libraries. Further, conventional algorithms are often useful for detecting radioisotopes behind shielding or in various media, however; they are not very effective at identifying radioisotopes at large standoff distances where the signal-to-noise ratio is small. This research aims to create a RIID algorithm with the capability of identifying radioisotopes in gamma-ray spectra wherein the radioisotope's characteristic gamma-energy peak in the spectrum is capable to the background noise. To accomplish this task, custom data smoothing and filtering algorithms were designed and compiled into a completely cross-platform program with an easy-to-use user interface. The algorithm incorporates a database of numerous radioisotopes, with focus being on isotopes of importance to the nuclear security industry. The database was also designed to be easy for the user to customize to the field of interest. The effectiveness of the algorithm was verified with both simulated and real source data. Overall, this algorithm has proved to be very useful for identifying radioisotopes in spectra with a low signal-to-noise ratio, which is a problem often encountered in the standoff distance in the nuclear field. ACKNOWLEDGEMENT: This work is being supported by the Defense Threat Reduction Agency under contract # HDTRA1-14-C-0038. This

support does not constitute an expressed or implied endorsement on the part of the U.S. Government.

Poster # 56

### **Development of Surrogate Nuclear Melt Glass Samples for Nuclear Forensics Applications**

*Colton Oldham*

Student's Department: Nuclear Engineering

Faculty Mentor: Howard Hall

Samples of synthetic trinitite were developed and created in previous experiments were analyzed to determine if they could serve as an accurate surrogates for the nuclear forensics community. By determining the major soil constituents found in Alamogordo, New Mexico and adding small amounts of uranyl nitrate, the synthetic trinitite recipe was developed to create sample matrix. Samples were also synthesized that were elementally similar to the urban environments of Houston, TX, USA and New York City, NY, USA. Half gram to gram quantities of each matrix were then melted in a high temperature drop furnace, removed quickly, yielding glass beads. All samples were analyzed via multiple analytical methods and it was determined that the synthetic samples produced could serve as a suitable surrogate for the nuclear forensics community.

Poster # 57

### **Charge Carrier Generation and Transport Properties of Lithium Indium Diselenide (LiInSe<sub>2</sub>)**

*Mikah Rust*

Student's Department: Nuclear Engineering

Faculty Mentor: Eric Lukosi

A relatively new I-III-VI semiconductor, lithium indium diselenide (LiInSe<sub>2</sub>), is being researched in the Nuclear Engineering department at the University of Tennessee. Due to the neutron sensitive Li-6 isotope in this semiconductor, this material shows great promise for neutron imaging and hand-held applications. This material has very high detection efficiency, however, its semiconducting properties have remained uncharacterized. Through two experiments this study aims to determine charge carrier generation and transport properties of LiInSe<sub>2</sub>. In the first experiment differential pulse height spectra were acquired as a function of the applied voltage. In the second experiment the rise time from the charge sensitive preamplifier was measured for various detector thicknesses and applied voltages. This was done to obtain essential information about the detectors electron drift velocity, mobility, and trapping time constant. Initial results from this study yield a trapping time constant for electrons of 267.2 ns, a  $\mu\tau$  value of 36.6E-6 cm<sup>2</sup>/V, and a W-value of 494 eV/e-h. The large W-value indicates a large charge loss at the location of charge creation. Future work will include identification of the mechanisms responsible for poor charge transport, the large W-value, and the asymmetric alpha response.

Poster # 58

### **Validation of a Radio-Isotopic Source Identification Algorithm for Broad Area Search Applications**

*Christopher Williams*

Student's Department: Nuclear Engineering

Faculty Mentor: Howard Hall

In a broad area search scenario, the ability to detect and identify nuclear material at increasing stand-off distances is of significant importance. To address this, a broad-area search Bayesian processor (BASBP) coupled to an aerial radiation detection system is being developed to locate and track radioactive materials. The detection system is comprised of a sodium-iodide scintillation detector and associated acquisition electronics mounted to an unmanned aerial vehicle (UAV). To aid in source detection, a radio-isotope identification (RIID) algorithm was developed to identify isotopes of interest during data collection campaigns. This poster will focus on validation of the RIID algorithm through experimental testing and modeling. To test the RIID algorithm, a series of small-scale experiments were performed,

varying the source-detector standoff distance, source type, and source strength. The experimental results were analyzed by the RIID algorithm then processed to determine if the algorithm could correctly identify the radio-isotopes. The experimental setup was modeled with Monte Carlo N-Particle (MCNP) to generate spectral data using a pulse height tally. The resulting tallies are compared to the measured spectra for validation. These scenarios demonstrated the algorithm's versatility in ability to accurately assess radiation data. Results from stand-off measurements and MCNP comparisons will be discussed. ACKNOWLEDGEMENT: This work is being supported by the Defense Threat Reduction Agency under contract # HDTRA1-14-C-0038. This support does not constitute an expressed or implied endorsement on the part of the Government.

## College of Nursing

Poster # 211

### **Healthcare Providers and Nursing Exchange Students' Perspectives on the Healthcare Systems in the United States (US) and United Kingdom (UK)**

*Victoria Anderson*

Student's Department: Nursing

Faculty Mentor: Karen Lasater

The basis of this project was to explore the perceptions of the US and UK healthcare systems in the perspective of healthcare workers. The idea was to look at these viewpoints and uncover ways to improve upon the US system. The project consisted of a series of interviews in the UK as well as the US. Healthcare plays a significant role in level of health in these countries, however each perceives the execution of care in a different light. The individuals in this research study follow either two ideals: healthcare for all or healthcare for some. UK healthcare providers found satisfaction with a basic national care coverage provided by the tax payer where as US workers found basic healthcare lacking and expensive. This research project finds significance in the fact that US provider's sensed significant changes needed in healthcare to contrast UK healthcare worker's satisfaction in the NHS. Each participant agreed on the reality of healthcare as an ever-changing system requiring upkeep and comparison to other systems in order to care for the modern- day patient.

Poster # 212

### **Comparison of Care Provided by Nurse Practitioners and Physicians**

*Carlos Anderson, Emily Lazek, Katherine Vogel, Kathryn Oliff*

Student's Department: Nursing

Faculty Mentor: Kathleen Thompson

**Problem Statement and Background:** The health care needs of our society continue to grow. The rising incidence of chronic disease and growing elderly population necessitate more efficient methods of providing care without sacrificing quality, accessibility, or affordability. Several studies have investigated the effects of utilizing Nurse Practitioners (NPs) in primary care positions on health outcomes. **Purpose:** This project investigates the role of NPs in providing access to quality, affordable healthcare compared to physicians and whether expanding NPs' practice authority improves access to care. It is anticipated that granting NPs full practice authority expands access to affordable health care and ensures quality of care at least as well as physicians in multiple health care settings. **Research Questions:** (1) Are NPs as effective in providing care as physicians? And (2) Do regulatory schemes granting NPs full practice authority expand patient's access to quality, affordable care? **Review of Literature:** Will include Newhouse, et al (2011), Horrocks, et al (2002) Kuo, et. al (2013), and others. **Conclusion/Recommendations for practice:** To be concluded

Poster # 213

**Shopping for a Soup Kitchen: Factors Contributing to Attendance***Allie Arnette*

Student's Department: Nursing

Faculty Mentor: Carole Myers

Food insecurity has become a growing problem in the United States (US); soup kitchens play an important role in feeding those who are not able to fully provide for themselves. In any given community, soup kitchens or food shelters exist for citizens in need. Many factors determine why people frequent certain soup kitchens. The literature contains information about the importance of an organization's ability to create a culture as well as the role an organization plays in helping clients meet their hierarchy of needs. A gap in the literature exists by failing to describe the specifics of organizational culture associated with soup kitchens. This literature review is compiled in order to assess a soup kitchen to further explore the importance of organizational culture via various aspects of services through the lens of Maslow's Hierarchy of Needs. This information may assist other organizations in making adaptations in order to best fulfill clients' needs. If society can better care for its vulnerable populations by ensuring their basic needs are met, an increase in overall health and a decrease in illness and hospitalizations may follow.

Poster # 214

**The Effects of Tactile Stimulation on Neonates Experiencing Neonatal Abstinence Syndrome***Rebecca Bell*

Student's Department: Nursing

Faculty Mentor: Deb Chyka

Among the population of neonates experiencing neonatal abstinence syndrome there is an astounding deficit of maternal presence within the NICU. Maternal care is critical to the physical and emotional development of any infant, and it is especially critical in the development of an infant experiencing withdrawal. Because of this deficit, many neonates are forced to cope without the comfort of a maternal presence. Nurses act as a substitute maternal figure; however, they do not have the time to provide care that is equivalent to a mothers'. A gap in the literature exists exploring the effect of "cuddlers" on the development of neonates experiencing NAS. Time provided by the cuddlers is spent one on one and may be calming both physically and emotionally. This research will address the gap by designating cuddlers for a portion of the neonates experiencing NAS, and evaluating their response. Evaluation will include assessing their physical responses such as temperature, heart rate, and blood pressure, and factors such as quality of sleep, feeding, and length of stay in contrast to those without cuddlers. Results from the research may provide evidence that supports the criticality of touch for neonates in order to meet typical developmental milestones.

Poster # 215

**Non-pharmacological Pain Management in Ophthalmologic Exams of the Neonate***Jacqueline Bennett, Elizabeth Barr, Lauren Knight, Steven Ensminger*

Student's Department: Nursing

Faculty Mentor: Kathleen Thompson

Retinopathy of prematurity (ROP) is an eye disorder that primarily affects premature neonates born prior to 31 weeks gestation or with a birth weight < 1,250 grams. ROP occurs as a result of abnormal blood vessels that grow throughout the retina which can result in scarring and retinal detachment. The changes that occur in blood vessels as a result of ROP cannot be seen with the naked eye; therefore, multiple eye exams are needed to identify the condition. Since all infants born prematurely are at risk of developing ROP and the condition cannot be detected without eye exams, many infants are subjected to this painful procedure. Purpose The purpose of this project is to examine non-pharmacological interventions available for pain management during ROP exams and determine the most effective intervention to minimize the distress associated with this procedure. If none have been identified, suggestions for

additional research will be made. Review of Literature: A preliminary review of literature has identified several methods that have been evaluated for non-pharmacological pain relief in neonates subjected to ROP exams. These interventions include nesting, withholding feeding, administration of oral sucrose with non-nutritive sucking, administration of expressed breast milk, oral glucose, and oral glucose compared to human breast milk. Conclusions - Recommendations for practice The methods that have exhibited the most effective pain relief are the administration of oral sucrose with non-nutritive sucking, as well as administration of expressed breast milk. Although there are conflicting studies on whether the administration of oral glucose is effective, there is no evidence to support the effectiveness of topical anesthesia and administration of oral dextrose. Further review of the literature is required to arrive at any definitive conclusions.

Poster # 216

### **Body Image, Physical Activity and Self-Concept in African American Adolescent Females**

*Jordan Casady*

Student's Department: Nursing

Faculty Mentor: Polly McArthur

Childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years. This epidemic has both immediate and long-term effects on health and well-being. Disparities in childhood obesity are more prevalent in minority populations, particularly African Americans (AA). Research supports that lifestyle choices and habits pursued in adolescence are a precursor to adult behavior, making physical activity (PA) interventions during the adolescence pivotal to leading a healthy lifestyle. Many community-based programs have been established to address the promotion of physical activity, self-perception, and nutrition. Further, evidence exists that suggests AA women view the ideal body image as more voluptuous, resulting in a predominance of a higher BMI. Little is known about the relationship between perceived body image and participation in PA among AA females. An additional gap in the literature exists relating to perceived body image among AA adolescent females and how it relates to participation in PA. As such, a study will be undertaken to explore the influence of body image on PA. Findings from this study will help healthcare providers better understand the relationship between body image and participation in PA in order to help tailor interventions to this unique population.

Poster # 217

### **Correlation between longer shifts and stress in nurses**

*Cara Chattin, Staci Dallachie, Myles Thomas*

Student's Department: Nursing

Faculty Mentor: Kathleen Thompson

Stress can contribute to poor health and negatively impact decision making. Various workplace factors can cause stress, including, particularly longer shifts at work. Working 12-hour shifts over time with decreased rest increases chronic stress and potentially inhibits one's health and decision-making. Purpose and research questions: It is the goal of this project is to research the effects of longer shifts on stress in nurses and how this affects healthcare decisions, job performance and patient safety. Review of literature: The literature that has been reviewed thus far that has been reviewed thus far indicates that longer shifts increase chronic stress in nurses. Proposed solutions for stress reduction are shorter shifts, naps in between shifts, and less consecutive days worked among others. Conclusions: Further research is needed before any conclusions can be drawn.

Poster # 218

**Kinship and Disaster Resilience in Rural Appalachia***Erin Conley*

Student's Department: Nursing

Faculty Mentor: Moriah McArthur

Rural Appalachia encompasses a wide range of land and people in the eastern United States, rich with history and culture. However, mountainous terrain and economic hardships create challenges for many residents in accessing resources such as healthcare, higher education, and other financial and practical assets, resulting in health disparities and lower access to care than urban areas. Low population density and distance further contribute to these challenges, especially during natural disasters. This region experiences frequent flooding and storms, leaving residents with damaged homes, closed roads, power outages, and no way to access help or properly evacuate. The purpose of this project is to explore how community strengths can improve disaster resilience among community members. Literature reveals that barriers to accessing primary healthcare are well documented, but little is known regarding how residents effectively cope with health and safety during disasters. Relationships are a source of social capital, bringing strength and power in the community. By focusing on kinship, communication, and decision-making, there is further research needed to explore how these factors can be utilized to improve disaster preparedness for rural populations.

Poster # 219

**HIV-related Stigma Among Women in Appalachian Tennessee and Alabama***Caroline Darlington*

Student's Department: Nursing

Faculty Mentor: Sadie Hutson

Southern Appalachia holds the highest incidence rate of HIV/AIDS in the United States (US). Societal stigmatization of HIV/AIDS due to assumptions about transmission and associated lifestyle plays a substantial role in the psychosocial well-being of people living with this chronic illness, particularly women in religiously and politically conservative areas. While HIV/AIDS is most commonly transmitted among Southern women through heterosexual contact and IV drug use, sources of stigma among women include misconceptions about HIV among healthcare professionals and the conservative cultural values regarding promiscuity and same-sex transmission typically associated with HIV infection. Clinically significant effects of stigma include lack of medication adherence, depression, self-isolation, and decreased self-worth. Spiritual coping and visual media have been effective in reducing experienced and internalized stigma among HIV-positive women. However, due to the cultural specificity of stigma, research on the HIV-related stigma unique to women in Southern Appalachian counties is a significant gap in the science. The purpose of the proposed study is to comprehensively describe specific sources and internalized effects of stigma among HIV-positive women in Appalachian Tennessee and Alabama. Findings from this study have the potential to lay the foundation for tailored stigma-reduction and psychosocial interventions for this unique aggregate.

Poster # 220

**Effectiveness of School Nurse Interventions on Childhood Obesity***Jessica Frazier, Ashley Tucker, Lindsay Samarin, Brittini Cripps*

Student's Department: Nursing

Faculty Mentor: Kathleen Thompson

With childhood obesity being such a major health concern in the United States, the issue of how to prevent childhood obesity and who needs to be part of the prevention plan is an often a dispute. It is evident that interventions must take place at a very young age for it to be prevented. School nurses can also play a vital role in a child's life by facilitating the necessary obesity prevention methods in the education setting, which is where children spend a majority

of their time. There is evidence that early interventions are the best attempt to prevent and treat childhood obesity. Purpose and Research Questions: The purpose of this project is to identify the most effective interventions a school nurse can implement in combating childhood obesity within the educational setting. If none are identified, potential questions for future research studies will be suggested. Strategies that have been studied include evaluating students' BMI, education on healthy foods and physical activity, and taking "brain breaks" throughout the day. Review of Literature: To date there is a little evidence for the effectiveness any of these interventions to decrease childhood obesity levels in the school setting. Since very few interventions have been implemented to decrease childhood obesity, questions have been raised regarding the success of strategies. Research lacks on the actual effectiveness of these interventions. Non-traditional approaches involving social media movements on diet and activity may be more effective for preventative measures. Conclusions: The conclusion is to be determined.

Poster # 221

### **Effects of Nurse-patient Ratio in Emergency Room Setting**

*Jennifer Gibson, Joseph Luncford, Tonya Reynolds, Miah Pavlik*

Student's Department: Nursing

Faculty Mentor: Kathleen Thompson

Problem Statement and Background: Emergency room overcrowding extends time to patient care. Currently, emergency room overcrowding is a hurdle that must be overcome in providing the best possible patient care in the hospital setting. This problem, however, could be improved by optimizing the number of nurses on shift to allow the emergency room to run more efficiently. A nurse-patient ratio in the emergency room setting may be able to improve patient care and reduce the problems related to emergency room overcrowding. Purpose and Research questions: The purpose of this paper is to evaluate nurse to patient ratios in the emergency department in order to determine the optimum number of patients per nurse in this setting. It will examine if a set nurse-to-patient ratio is the preferred way in which to optimize patient care and following, what this ratio should be. Design: A review of literature related to nurse-to-patient ratio in the emergency department was performed. Results: To be determined Conclusion: To be determined

Poster # 222

### **Efficacy of Cranberry Ingestion in the Prevention of Urinary Tract Infections**

*Laura Hauk, Adele Crouch Lester, Devon Moser, Thomas Burns*

Student's Department: Nursing

Faculty Mentor: Kathleen Thompson

Urinary tract infections (UTIs) are a huge problem, with 150 million cases globally and health-care costs totaling \$6 billion annually. Preventing community acquired UTIs will reduce doctor-office visits, admissions to hospitals, productivity losses, as well as pain and discomfort in millions of people. Women suffer acute bladder infections on the order of 1000 times more frequently than men. Using antibiotics prophylactically is contraindicated due to increasing bacterial resistance and elimination of naturally protective urogenital microbes resulting in opportunistic infections. An appropriate nursing intervention to prevent UTIs is to educate patients about non-pharmacological evidence based practices. Drinking cranberry juice has long been thought to lower the incidences of UTIs, be it due to lower urine acidity or biochemical changes to the urethral lining. We present the results of a review of published clinical trials evaluating the effectiveness of ingesting cranberry juice and other berry products for preventing UTIs and present our recommendations for incorporating the findings into evidence based patient education by nurses.

Poster # 223

**Physical Health Experiences of a Male Caregiver of a significant other with Breast Cancer***Meredith Haynes*

Student's Department: Nursing

Faculty Mentor: Sadie Hutson

Breast cancer is the most common cancer diagnosis among women; the majority of women who bear this diagnosis are married. Male spouses of women with breast cancer are affected by the diagnosis in numerous ways including: intimacy and communication, emotional responsiveness, and sexual satisfaction. The purpose of this presentation is to elucidate the current state of the science regarding the effects of a breast cancer diagnosis on the male partner. The majority of published studies focus on psychosocial effects experienced by male spouses such as depression, mood changes, anxiety, tiredness, and psychological distress. In many cases, these effects have been associated with a decreased quality of life. Physical health effects of the male caregiver are largely unknown, leaving a gap in the science. Understanding the overall physical health of the male partner during diagnosis and treatment of breast cancer is critical to address the partners' needs, particularly in light of their caregiving responsibilities during this difficult time. Findings from this study have the potential to lay the foundation for healthcare providers, including oncology nurses, to develop interventions and preventive strategies to tailor clinical care and psychosocial support to male spouses of women with breast cancer.

Poster # 224

**Breastfeeding Education: Perceptions of NICU Nurses And Mothers of Infants With NAS***Jessie Herz, Hannah Campbell, Savannah Pressley*

Student's Department: Nursing

Faculty Mentor: Sadie Hutson

Neonatal Abstinence Syndrome has seen a 10-fold increase throughout the United States since 1999. This epidemic is emerging as the rate of illicit and prescription drug abuse is on the rise. NAS not only has a health cost for the infants, but also a financial cost as these neonates require longer hospital stays and intense care. Neonates born prematurely or with severe health issues are placed in the NICU and are commonly breastfed by their mothers. Research supports that breastfeeding NAS infants will also help control and treat the symptoms of NAS. The objective of this research project is to examine the concepts related to NAS and breastfeeding to provide of framework of understanding the factors that influence nurses' breastfeeding education to mothers of NAS infants.

Poster # 225

**Perceptions of Maternal Identity Development: A Nurse's Role***Kimberly Holtsclaw, Elizabeth Cantrell, Jessika Fletcher, Lashonna Willis, Catherine Pomeroy*

Student's Department: Nursing

Faculty Mentor: Sadie Hutson

As mothers give birth to preterm infants, they become submerged in the environment of the Neonatal Intensive Care Unit (NICU). The environment presents a unique challenge to the development of the maternal role and, subsequently, maternal identity. In order to overcome the stressors of the milieu, nurses play a key role to calming emotional distress and facilitating role attainment. While it is known that maternal identity development is impacted by the NICU and the nurse plays a role in mitigating maternal stressors, there is an absence of literature on a mother's opinion of these simultaneous events. Using a qualitative descriptive design, this study will explore the perceptions of NICU mothers with a minimum stay of ten days as to the meaning of maternal identity. It will also encompass where they are in the process and what nursing actions played a role. Attaining these subjective perceptions of which nursing actions facilitate or impede maternal identity development will be essential for modifying interventions, refining communication, and improving overall care to this vulnerable population.

Poster # 226

**Immune Overload? Parental Attitudes towards Combination and Single Antigen Vaccines***Ella Hulsey*

Student's Department: Nursing

Faculty Mentor: Tami Bland

Parental concerns have led to a recent decline in immunization coverage, resulting in outbreaks of diseases that were once under control in the US. As the CDC vaccination schedule continues to increase in complexity, the number of required injections per office visit increases as well. Some parents perceive that there is trauma associated with the administration of multiple injections, and research shows that having multiple vaccines due in a single visit is associated with delays and lower immunization rates. Combination vaccines make vaccination more efficient by incorporating the antigens of several different diseases into a single injection, but many parents worry that they may overload the child's developing immune system and leave him or her susceptible to secondary infections. This study aims to elucidate the scope and nature of these fears through a descriptive survey distributed to 100 parents of children aged 6 and younger. Parents were asked about their opinions regarding combination and single antigen vaccines, and how these opinions affect their vaccination practices. The results of this survey allow practitioners to more directly address parental concerns and provide specific educational materials to allay their fears.

Poster # 227

**Effects of Breastfeeding on Finnegan Scoring in the Neonatal Abstinence Syndrome Population***Kathleen Kerr, Therese Miller, Chandler Williams*

Student's Department: Nursing

Faculty Mentor: Ezra Holston

Neonatal abstinence syndrome, now referred to as NAS, is a growing phenomenon throughout the country; numerous babies are born exhibiting withdrawal symptoms from drugs. The number of neonates with NAS tripled between 2000 and 2009 and there was a high of more than 13,000 infants born with diagnosed neonatal —abstinence syndrome (Pritham, 2013). There is also controversy between whether or not mothers of these babies should be encouraged or discouraged to breastfeed throughout the weaning process. There is adequate literature supporting a decrease in Finnegan Scoring in breastfed NAS babies. However, there is a lack of adequate information regarding the duration of the Neonatal Intensive Care Unit (now referred to as the NICU) stay as well as the type and quantity of drug use by the mother, thereby provoking a need for further research. By exploring the areas of the effect of the duration of NICU stay, as well as type and quantity of drug exposure, areas where education, research, and change in policy and procedure are needed for the NICU NAS treatment team are highlighted. Due to the fact that the average NICU stay for an NAS baby extends past the point of previous research, and that there is no research noting the babies Finnegan Scores for this period of time, researchers should observe these scores as a tool to assess if breastfeeding helps in the reduction of NAS symptoms for the entirety of the NICU stay. Reference: Pritham, U. (2013). Breastfeeding promotion for neonatal abstinence syndrome. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 42, 517-526.

Poster # 228

**Stimulant Misuse in Nursing Students***Bernadette Kolp, Madeline Himber, Lauren Smith, Madison Gray, Lauren Mench*

Student's Department: Nursing

Faculty Mentor: Sally Helton

Stimulant use among students is a growing problem on university campuses across the country. Increased stress during the college years caused by academic pressure may push students to turn to illegal substances that enhance cognitive function. The research studies examined showed a relationship between stimulant misuse, college students, and healthcare professionals related to the increased availability of certain stimulants. The majority of those studied reported cognitive enhancement as a goal of stimulant use. High-stress nursing exams were directly related to licensure

exam success rates. Despite this wealth of knowledge, there was a lack of information regarding the use of stimulants among nursing students. Our group is interested in eventually collecting research that connects these two phenomena. The purpose of this research proposal is to explore the substances used, the frequency of usage, and the perceived effects of prescription stimulant misuse of nursing students attending the University of Tennessee, Knoxville. With the proposed research, knowledge could be obtained that may yield further research in this area.

Poster # 229

### **Effectiveness of Music Therapy on Pain in Palliative Care**

*Samantha Lusebrink, Brandon Rowan, Shih-Huei Ou, Thomas Parrish*

Student's Department: Nursing

Faculty Mentor: Kathleen Thompson

Music is an alternative (or adjunct) therapy that is thought to promote relaxation and decrease reported pain level. Music therapy is of particular interest to patients who are in chronic pain as the result of disease processes. These patients are often on powerful narcotic analgesics that have many undesirable side effects. Music therapy could potentiate the effects of narcotics and allow for the smallest effective dose to be administered. Purpose and research questions: The purpose of this paper is to determine if using music therapy, as an adjunct to traditional pain relief measures, is an effective intervention to decrease reported pain level and increase comfort. Additionally, we will explore the various techniques used in providing music therapy and whether any one method appears to be more effective. Review of literature: To be reviewed. Conclusions: To be determined.

Poster # 230

### **Developmental Screening in Children and the Emotional Response Elicited by the Parents to the Outcome: A Pilot Study**

*Ashley Manus*

Student's Department: Nursing

Faculty Mentor: Deb Chyka

The use of age-appropriate developmental screening tools in young children may be the initial step in the identification of socialization, language and/or motor skills delays when further evaluation is conducted. Early detection of these delays, with subsequent early intervention in children, is critical to their proper growth and development. Elective evaluation, however, is contingent upon the willingness and desire of the parents to seek evidence regarding atypical results of the screening process. A gap exists in the literature that does not address parental responses or emotions experienced after receiving notification that their child may have a developmental concern. A response of trepidation may cause some parents to hesitate pursuing further evaluation of their child resulting in a delay of a definitive diagnosis and early intervention. As such, this research will address this gap by screening a not-at-risk population of children and then evaluating and examining the responses of parents who receive information about a potential developmental concern in their child. Results from this project may provide evidence that will guide discussion between parents and healthcare providers with the goal of improving the rate of follow-up evaluations that could lead to earlier diagnosis and treatment planning.

Poster # 231

### **Factors that Drive a Low-Risk Multiparous Woman's Decision on Where to Give Birth**

*Elizabeth McLaughlin, Tayler Moon, Taylor Neal, Taylor Williams, Adam Tudor*

Student's Department: Nursing

Faculty Mentor: Sadie Hutson

Current literature reveals a range of information regarding perinatal outcomes and satisfaction rates between birthing centers and hospitals. However, there is insufficient knowledge regarding how expecting mother's make such a

decision. Therefore, by conducting a qualitative descriptive study factors and concepts such as previous experiences, socioeconomic factors, geographical location, education, age, and cultural preferences can be studied in an effort to understand how they influence a woman's decision to give birth in a hospital setting versus a birthing center. An explicit approach and reason for each mother's decision is not the goal of this study. It is understood that each factor can have an entirely different influence from situation to situation; therefore, being aware of which factors are influential can greatly improve patient care. For example, nurses will be able to provide more personalized holistic care while also further educating and preparing expecting mothers. Conducting more research will help to guide the decision making process and in return lead to healthier outcomes for both the mother and baby.

Poster # 232

### **Impact of Hospital-Associated Sitters in Care of Unattended Pediatric Patients**

*Michael Moore*

Student's Department: Nursing

Faculty Mentor: Tami Bland

The issue of caregiver absence during a child's hospital stay has been a longstanding clinical challenge. This project will explore the new "Patient Pals" program at East Tennessee Children's Hospital. This program uses hospital volunteers for surrogate supervision during the temporary absence of the patient's caregivers during an inpatient hospital stay. The purpose of this presentation is to share the state of the science regarding the effects of unaccompanied children in the inpatient setting and a research design exploring the benefits of hospital-associated sitters for hospital staff and patient families. A review of literature was conducted using online databases such as CINHALL and PubMed identifying key literature. Previous research has demonstrated that the situation of caring for unattended pediatric patients increases nurse workload and emotional strain. Adverse patient health outcomes, such as increased anxiety, blood pressure and respiratory complications from crying, and fall risk, have been well documented. However, a significant gap exists regarding the affects of hospital-associated sitters on the staff and parents perceptions of this service. As such, the author has designed a quantitative investigation to address this gap. Data from this project will provide the foundation for increased hospital support for programs such as the "Patient Pals".

Poster # 233

### **New Graduate Nurses Impact of Mentoring Relationship on New Graduate Nurses' Patient Care and Retention Rates**

*Elisha Mott, Cortney Bigoness, Matthew Burlison, Emily Butcher, Savanna Taylor*

Student's Department: Nursing

Faculty Mentor: Sadie Hutson

Nurse turnover rates are on the rise, particularly among new graduates. Previous research has demonstrated reasons contributing to this increased rate among new graduate nurses including: job dissatisfaction, stressful work environment, and a lack of mentoring relationships. Little is known about the specific aspects of the mentoring relationships and whether mentors or seasoned nurses guide new graduates in developing a sense of responsibility, pride, and dedication to the profession. This represents a significant gap in the literature. The purpose of this presentation is to provide the state-of-the-science on this topic. Further, the authors propose a qualitative descriptive study to explore new graduate nurses' perceptions about their mentor relationships and how they might impact attitudes and practices during transition from the educational environment to a professional practice/hospital setting. These findings may help mentors guide new graduate nurses to develop dedication to the profession and allow organizations to implement better orientation and mentoring relationships to raise retention rates and enhance stability in the healthcare setting.

Poster # 234

**Positive and Negative Perceptions of Marinol Among South Appalachian Oncology Patients***Lucy Parham, Sarah Jenner, Clara Sawyer, Laura Schmid*

Student's Department: Nursing

Faculty Mentor: Sadie Hutson

The use of Marinol (medical marijuana) as an antiemetic, analgesic, and appetite stimulant for symptom management of cancer patients is a controversial topic about which there is little research. Specifically, information regarding patient perceptions and knowledge about Marinol is missing. The purpose of this presentation is to highlight the state of the science regarding Marinol use in the oncology setting. Databases including Pubmed and CINAHL were searched using key words such as: marijuana, Marinol, medical marijuana, stigma, THC, research, perception, oncology, Appalachia, culture, and demographics. The findings are organized into six main themes: the history of Marinol, therapeutic potential, oncology palliative care, stigma, Appalachian culture and demographics, and use of Marinol over traditional drugs. We propose a qualitative study that could be conducted in the future to address the gaps in the science regarding the use of this therapeutic strategy. These findings enhance healthcare providers' understanding of the existing science on Marinol; as such, will assist them in making treatment decisions using the best available evidence.

Poster # 235

**Patient Perception of Assimilation in Bilingual Discharge Facilitation***Merrell Pressley*

Student's Department: Nursing

Faculty Mentor: Karen Lasater

Growth of the Hispanic population in the United States (US) has contributed to an increase of limited English proficiency speakers, which presents a need for better communication strategies. Language barriers (LB) hinder effective communication in healthcare. Providing culturally competent care to Spanish speakers to promote their assimilation into the US healthcare system presents a challenge to many health care providers (HCP). LBs may alter accuracy of care and patient comprehension, which can lead to poor healthcare outcomes. Hispanic migrants often use the emergency department (ED) for primary care. Many Spanish-speaking patients leave the ED misinformed with limited understanding of the diagnosis or the necessary treatment to prevent adverse outcomes. Many hospitals have provided interpreters and language interpretation tools, such as phone lines or bilingual teaching pamphlets; however, it is unclear whether these tools are perceived by patients as effective with regard to their comprehension of discharge instructions. Research is needed to evaluate the patient's perception of the discharge process in this patient population in the ED setting. A study will be undertaken to assess the patient's experience of bilingual discharge facilitation or the lack thereof. This study will explore Spanish-speaking patient's comprehension of and experience with ED discharge instructions through audio-recorded interviews in the patient's primary language.

Poster # 236

**The Impact of Criminalization of Addiction in Pregnancy***Autumn Quillen, Jackson Butler*

Student's Department: Nursing

Faculty Mentor: Sharon Davis

A large public health issue that has become pertinent to Tennessee lawmakers in Tennessee is the criminalization of pregnant women who abuse opiate substances during their pregnancy and give birth to a baby diagnosed with Neonatal Abstinence Syndrome (NAS). Studies have revealed a strong correlation between babies diagnosed with NAS and mental, physical, and intellectual problems in childhood and later in life. Because of the nature of the impact on a developing fetus and neonate, lawmakers passed a law declaring that pregnant women who abuse opiate substances while pregnant will be

criminally charged for the harm or death of a neonate diagnosed with NAS, with the only exception being enrollment in an inpatient drug and alcohol rehabilitation program. However, with few treatment options available for pregnant women in Tennessee and with the depth of the disease of addiction, it is a concern among health professionals across the state as to whether this law will further aggravate problems in that women will no longer receive any prenatal care while pregnant. Therefore, a correlational prospective study has been developed to address this concern and determine possible correlations of an increase in a lack of prenatal compliance in correlation with this criminalization law. By conducting interviews with 20 pregnant women in Tennessee who are currently addicted to opiate substances and women who have given birth to NAS babies at various medical and mental health facilities in the state, data may be gathered that allows for the collective interpretation of themes in regards to prenatal compliance as related to the criminalization law in Tennessee. With this, more information can be gathered that helps decide the ultimate impact of the law upon the law's expiration in July 2016.

Poster # 237

### **Communication between Spanish-speaking Families and Nurses in Pediatric Acute Care**

*Kylie Slayden*

Student's Department: Nursing

Faculty Mentor: Sandy Mixer

The growing number of Spanish-speakers in the U.S. poses distinct communication challenges to health care institutions. Language barriers (LBs) in health care are associated with adverse events during hospital stays, indicating the significant impact of LBs on patient safety. This purpose of this presentation is to provide an overview of the literature on communication challenges in the acute care setting with Spanish-speaking patients and families. A comprehensive search to compile the literature was completed using the databases CINAHL, PubMed, and Google Scholar. Although current strategies such as in-person and telephonic interpreters exist, little is known about their efficacy in reducing deficits in communication. Health care facilities nationwide are investing in medical interpretation services to provide care consistent with the patient's primary language. Yet the pattern of interpreter use among hospital staff is disjointed and LBs remain, raising concerns of safety and quality of care. Nurses may often be without interpreter support during bedside care of limited English-proficient patients and little is known about communication between nurses and these patients and families. Therefore, a qualitative descriptive research study will be undertaken to examine basic communication between nurses and Spanish-speaking limited English-proficient families/guardians of pediatric patients at East Tennessee Children's Hospital following the development and piloting of a bedside translation tool.

Poster # 238

### **Parental HPV Vaccine Acceptability Factors in Southern Appalachia**

*Lauren Speck*

Student's Department: Nursing

Faculty Mentor: Sadie Hutson

Southern Appalachia is plagued with an increased incidence and mortality rate of cervical cancer; human papillomavirus (HPV) is the leading cause. Previous research has uncovered several factors that affect HPV vaccine uptake such as, knowledge of the disease and vaccine, susceptibility to and severity of the virus, and vaccine barriers/benefits. However, a gap exists in the literature pertaining to the role of both parents in the decision to have their children vaccinated. Specifically, dyad interviewing techniques have not been pursued among the culturally-unique Appalachian population. The purpose of this study is to assess mother-father dyads' awareness, knowledge, attitudes and opinions related to HPV and the vaccine for male children. Subjects for this study were recruited by convenience sampling. Following IRB approval, the investigator used mixed-methods data collection techniques via surveys and dyad face-to-face, semi-structure interviews. Emergent themes include: fathers' lack of knowledge of HPV and the HPV vaccine, lack of parental communication about the vaccine, a maternally- dominant model of healthcare decision-

making and vaccine acceptance, and skepticism regarding vaccine safety and side effects. Findings from this study will lay the groundwork for future studies as well as education and interventions targeted at the needs of parents to increase vaccine uptake.

Poster # 239

### **Married and Unmarried Cohabitation Impact on Maternal Reproductive Behaviors and Neonatal Health Factors**

*Ashley Steinmetz*

Student's Department: Nursing

Faculty Mentor: Ezra Holston

There has been a rapid increase in the number of unmarried couples that participate in the same family practices as their married counterparts such as having children and cohabiting in the same residence. Unmarried cohabiting mothers are at a higher risk of smoking, experiencing symptoms of depression and having more stressful pregnancies than married cohabiting mothers. These conditions place the neonates of unmarried cohabiting mothers at an increased risk for low birth weight, low Apgar scores and low gestational age. Such findings suggest that these unmarried cohabiting mothers and their neonates are not receiving the proper support required during pregnancy. Perhaps the effect of being in a legally sanctioned union such as marriage has a health promotional effect on maternal reproductive health behaviors and neonatal health factors. Failure to recognize and/or understand this effect can possibly contribute to adverse health effects. Therefore, the purpose of this presentation is to lay the foundations of a proposed project that will explore the perceptions of unmarried and married cohabiting mothers about maternal reproductive health behaviors and the effect of these perceptions upon neonatal health factors. This information will be instrumental in promoting appropriate antenatal care practices for healthy pregnancies and neonatal health factors.

Poster # 240

### **Discharge Teaching in Non-Native Speaking Patients**

*Kira Storms, Alexandra Gardner, Elizabeth Thompson, Traci Adkins*

Student's Department: Nursing

Faculty Mentor: Kathleen Thompson

With the pressure to decrease the length of stay in hospitals, proper discharge teaching has become vital in the road to recovery for patients. However, with discharge instructions increasing in complexity, along with limited time and resources for the patient and family members, patients' recovery may be compromised. In addition to these factors, adding a limited proficiency in the language used in the discharge teaching is a cause for concern. With this in mind, patients who are unable to understand discharge instructions due to his or her inability to comprehend the language are at added risk for a reduced quality of care post-discharge. Purpose and research questions: The purpose of this project is to review the need to providing hospital discharge instructions to a patient in his or her native language or in a manner that he/she or their family will understand, including the reading level of the discharge materials. Review of Literature: There are several studies that have researched the efficacy of discharge instructions in those with limited proficiency in the language, in decreasing medication errors and returns to the emergency department. There is limited research in the improvement of post discharge care when alternative interventions (i.e. interpreter) are applied. Conclusions – Recommendations for practice: Conclusion is to be determined.

Poster # 241

**Reporting of Central Line-Associated Bloodstream Infections***Benjamin Woodward*

Student's Department: Nursing

Faculty Mentor: Reba Umberger

Central line-associated bloodstream infections (CLABSIs) occur at an estimated rate of 4.1-6.1 infections per 1,000 catheter-days in medical-surgical ICUs, resulting in an absolute mortality increase of 10-30 percent for these patients. CLABSIs are infections of the blood attributed to a central line. Diagnostic criteria follow the Centers for Disease Control and Prevention guidelines for laboratory-confirmed bloodstream infections (LCBIs). LCBI 1 requires one or more positive blood cultures within a 24-hour period unrelated to an infection of any other site; and, LCBI 2 requires patient fever or hypotension with the positive blood cultures. The purpose of this presentation is to elucidate the state of the science regarding CLABSIs, with emphasis on reporting, as changes have occurred with new legislation such as mandatory reporting and the Affordable Care Act. Following an extensive search of online databases, the author reviewed eight key articles regarding CLABSI prevention and best practices. Overall, CLABSI rates have decreased in the past decade, yet focus must remain on CLABSI prevention. There is a gap in the science pertaining to how the previously mentioned legislation has influenced CLABSI reporting rates and processes of care related to CLABSI. Future research will explore accuracy of reported incidence rates.

Poster # 242

**An Evaluation of the Precious Prints Project: The Emotional Impact of Preparing a Keepsake on NICU, PICU, and ER Nurses***Bethany Worsham*

Student's Department: Nursing

Faculty Mentor: Reba Umberger

Emotions are a complex part of the human experience; they permeate every aspect of life—including the workplace. Nurses have a unique familiarity with emotions because they work so closely with patients and families and offer not just physical attention, but emotional care as well. This research project examines the emotional experiences of nurses who work in the neonatal intensive care unit (NICU), pediatric intensive care unit (PICU), and Emergency Department (ED) at a children's hospital in the southeast. Using Le Poidevin's Multidimensional Model of Grief, the Primary Investigator (PI) explores the emotional impact of preparing a keepsake—specifically a Precious Metal Print, which is a thumbprint made into a charm and hung on a necklace—made for families who have lost a child through the Precious Prints Project. There are three types of “work” that occur within the model: functioning work, grief work, and growth work, upon which the interview questions were based. Some preliminary findings from interviews include, “you get at little bit...I think the gamut of emotions when you deal with someone's death” and “my worthiness as a nurse to provide something good [a Precious Metal Print] for somebody.” This pilot project seeks to expose the different themes of each of these types of work that is revealed in NICU, PICU, and ED nurses.

Poster # 243

**Exploring Nursing Students' Perceptions of Electronic Fetal Monitoring App***Rachael Wyatt, Isaac Moore, Valerie White, Michelle Miller, Callie Heitzman*

Student's Department: Nursing

Faculty Mentor: Susan Fancher

Within the healthcare realm, innovative technology has become an integral part of teaching in today's nursing education, specifically computer-generated teaching applications. A new application that combines both nursing simulation and teaching methods regarding electronic fetal monitoring and fetal heart rhythms was developed at the University of Tennessee in fall 2014. This application was created in collaboration with both the College of Engineering

and the College of Nursing. The Electronic Fetal Monitoring App displays instructor-created fetal heart rate (FHR) and maternal contraction patterns to simulate a monitor enabling live-feed interpretation in the classroom or simulation setting. It also has the potential to be saved and recreated for further simulated learning experiences. With current nursing education using processes such as application involvement and simulation in the clinical environment, the evolution and merger of simulation and technology applications has the potential to exponentially benefit patient outcomes. Therefore, with the creation of a novel simulation application incorporated into the classroom setting, the purpose of this qualitative descriptive study is to explore nursing students' learning experiences, attitudes, perceptions, and opinions regarding a fluid, dynamic, instructor-manipulated EFM application.

## College of Social Work

Poster # 155

### **Discrimination and Employment Outcomes of Immigrants in the United States**

*Catherine Arwood*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

Finding employment is necessary for immigrants' self-sufficiency. This study explores factors that influence successful employment among recent immigrants in the United States. Understanding these factors helps social service providers meet the needs of foreign-born clients. Methods: Outcomes were examined for 373 Latino and Asian respondents who immigrated to the United States within five years prior to the survey, and are working (n=330) or looking for work (n=43), as reported in the National Latino and Asian American Study. Surveyors conducted interviews at respondents' homes in the respondents' preferred language. Analyses compared employed and unemployed workers based on English language proficiency, education, social capital, discriminatory experiences, age, gender, and race/ethnicity. Results: Unemployed immigrants reported higher levels of education and English proficiency than those who were working. Results of a chi-square test of indicated a significant relationship between gender and employment,  $\chi^2(1, N=373)=7.271, p=0.007$ . Females were more likely to be unemployed (16.4%) than men (7.4%). Respondents also reported experiencing discrimination due to race, ancestry, ethnicity, or skin color. Conclusions: Based on findings education levels and English deficiency did not necessarily prevent immigrants from finding employment in the United States. However, discrimination may reduce employment chances, especially for female immigrants.

Poster # 156

### **Independent Senior Adults' Ability to Complete Instrumental Activities of Daily Living**

*Rachel Brown*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

Senior adults are living longer due to healthcare advances. Resulting in higher costs, including long-term institutionalization. Previous studies revealed that offering seniors helping services to complete daily activities increases ability to live independently. The purpose of this study is to assess independent senior adults' ability to complete instrumental activities of daily living (IADL). Methods: Thirty-Four seniors were surveyed to assess ability to complete IADL, as defined by the Lawton IADL Scale. Results were analyzed by first looking at the senior adults' ability to complete IADL and by comparing male and female abilities to complete IADL. Results: Out of this population, 20.6% are male and 79.4% are female. The category in which both genders struggle most is ability to complete heavy housekeeping, 23.5% of respondents reported needing help in this area. Physical and emotional disturbance variable showed significant p-value .491 and Z statistic -.022 as did housekeeping with p-value .0915 and Z statistic -1.333. Conclusions: Participants that have completed the survey each struggle to complete IADL in at least one area. Males have shown a decreased ability to complete, compared to women. The findings provide a basis for practitioners to

provide effective interventions to independent senior adults.

Poster # 157

### **Effectiveness of Parenting Education on Self-Efficacy Among First-Time Mothers**

*Carly Caldwell*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

Pregnancies can cause anxiety, especially among first-time mothers, due to their inexperience. Quality parenting education is needed so first-time mothers can become knowledgeable and confident about their pregnancies, which will reduce anxiety. Methods: Participants in parenting classes at a local community resource center were surveyed to determine the effectiveness of the classes on the self-efficacy of first-time mothers. Surveys were administered before and after the classes, using the General Self-Efficacy Scale (GSES) and the Early Intervention Parenting Self-Efficacy Scale (EIPSES). Additionally, participants were asked five qualitative questions during pretest and posttest interviews. Results: Results indicated that there was a significant difference in participant responses to questions about dealing with unexpected circumstances ( $Z=-2.636$ ,  $p=.008$ ), problem-solving ( $Z=-2.121$ ,  $p=.034$ ), and parenting self-confidence ( $Z=-2.414$ ,  $p=.016$ ). In all, nine of ten items measuring general self-efficacy and eight of ten items measuring parenting efficacy were found to be significantly different. The results indicate that first-time mothers' self-efficacy increased after the intervention. Implications: Parenting classes were effective in improving the perceived self-efficacy of first-time mothers. The framework utilized in this community resource center may be useful in improving other parenting education models.

Poster # 158

### **Factors Associated with Successful Completion of a Comorbid Substance Abuse and Mental Health Intensive Outpatient Group**

*Matthew Crescenzi*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

An East Tennessee community mental health center, specializing in co-occurring substance abuse and mental health services, has an Intensive Outpatient Program (IOP) that utilizes a combination of cognitive behavioral therapy, motivational interviewing, and relapse prevention. Currently, 50% of individuals who enter the IOP program fail to graduate. The purpose of this study is to identify the factors associated with successful program completion. Methods: A secondary analysis was conducted on data from 116 participants in the IOP group. A logistic regression model was used to determine which factors were related to successful program completion. Results: The overall regression model was found to be statistically significant, ( $\chi^2(20, N = 115) = 39.06$ ,  $p < .05$ ). Results indicate that age was a significant variable ( $p = .026$ ), and with each increment in age, the odds of completion increased by almost 6%, when controlling for other variables in the model. Likewise, each increment of medication adherence ( $p = .024$ ) increased odds by 46.6%. Conclusions: Acquiring insight into the backgrounds of the individuals who enter the IOP will allow practitioners at the local mental health center to better understand their clients, and in turn, adapt their program to increase retention rate.

Poster # 159

### **Factors that influence drug use among youth in foster care**

*Anastasia Friedrich*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

Children in foster care tend to exhibit increased rates of illegal substance abuse. This study explores the factors that influence drug use among youth in foster care. The identification of these risk factors, and the development of

prevention programs are vital for child welfare agencies to effectively serve families in need. Methods: This study analyzes approximately 14% (n=108) of youth in foster care in an Eastern Tennessee county. Secondary data were used to assess significance of relationships between drug use in foster care youth and the youth's age, gender, race, and parent history of substance abuse. For the purpose of this study, substance abuse is defined as the illegal use of any mood-altering substance such as marijuana, cocaine, amphetamines, barbiturates, tranquilizers, inhalants, or opiates. Results: Preliminary results include a chi-square test, which indicated that there was not a significant relationship between parent history of substance abuse and substance abuse among youth in foster care ( $\chi^2(1)=1.378$ ,  $p=.241$ ). Conclusions: Based on findings, 88.9% of parents have documented histories of substance abuse. However, parent history of substance abuse did not appear to influence drug use in the initial findings.

Poster # 160

### **Impact of Community Reentry Services on Recidivism**

*Jordan Frye*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

With growing inmate populations, more agencies are attempting to address both the legal and the environmental factors influencing criminal behavior. While more agencies begin to adopt this model of representation, little is known about the effectiveness of providing community based reentry services to inmates. To fill the gaps in the literature, this study will evaluate the factors that might impact client recidivism in community setting. Methods: This study uses secondary data from the social services branch at a public defender's office. The sample includes the participants of a program for inmate reentry into the community from 2012 to 2014 (n=332). Participant completion status and treatment goals were compared with recidivism data using a chi-square test to determine the efficacy of community based reentry services. Results: After at least one year, only 18.4% of clients receiving community based reentry services recidivated. Results indicate that program completion status does not necessarily impact recidivism among clients one year following discontinuing services in community reentry programs ( $\chi^2(1)=2.859$ ,  $p=.091$ ). Conclusions and Implications: The findings indicate that although program completion status might not impact recidivism rates, having access to community based reentry services could influence recidivism.

Poster # 161

### **The Effects of Poverty on Individuals with Co-occurring Mental Health and Substance Abuse Disorders**

*Emily Hill*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

People with mental illness are at a higher risk for harmful drug use and dependence, but the mechanism behind this isn't clear because of multiple contributing factors. Poverty contributes to both of these variables separately, but because it is a known special barrier to mental health treatment, examining its effects on co-occurring mental health and substance abuse disorders could lead to a greater understanding of how the three intersect. Methods: A total of 873 participants included persons with Generalized Anxiety, Bipolar, or Major Depressive disorders from the National Comorbidity Survey Replication (NCS-R). The study analyzes the relationship between poverty and individuals with co-occurring substance abuse disorders. Results: Preliminary results did not show statistically significant relationships between poverty and indicators of alcohol abuse ( $\chi^2(1)=1.001$ ,  $p=.317$ ), marijuana/hashish ( $\chi^2(1)=.972$ ,  $p=.324$ ), cocaine abuse ( $\chi^2(1)=2.768$ ,  $p=.096$ ), or non-prescribed prescription drug abuse ( $\chi^2(1)=1.601$ ,  $p=.206$ ). Despite this, 67.9% of those reporting marijuana use and 63% of those who abused non-prescribed prescription drugs were living in poverty. Conclusions: While initial analyses did not detect statistically significant relationships between poverty and substance dependence, the majority of individuals reporting substance abuse also reported living in poverty.

Poster # 162

**The Effect of an Adolescent's Physical Health on Mental Health and Substance Abuse***Amanda Murphy*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

This study seeks to identify factors that correlate with adolescents' level of mental functioning and substance abuse, in order to determine who may be at-risk for these problems. Determining an at-risk population will help social work professionals identify and intervene early in order to prevent these problems. Methods: A secondary analysis was conducted using data from the California Health Interview Survey (CHIS) of Adolescents. Numerous individual-level factors were examined and correlational statistical tests were conducted to determine these physical health factors' relationship to mental health and substance abuse outcomes. Results: Preliminary results indicate a statistically significant correlation between variables related to an adolescent's poor physical health, such as number of doctor visits in the past year and increased risk of having experienced serious psychological distress in the past month. For these variables, statistical testing revealed a negative correlation of -0.41 with a p-value of 0.03. Conclusions: By identifying the adolescents with poor physical health as an at-risk population for mental health issues and substance abuse problems, social workers can implement interventions sooner and more effectively. Hopefully, from this, less at-risk adolescents will end up developing these problems.

Poster # 163

**Healthy Eating Habits and Access to Nutritional Foods in Low-Income Women***Megan O'Hare*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

Individuals with limited resources often partake in poor eating habits, and withhold from fulfilling nutritional needs. The purpose of this research is to isolate the barriers to successful health of low-income women. Methods: Residents were asked to complete a health and nutrition survey, comprised of questions about their nutritional health. A sample of women was selected from survey respondents, and those chosen participated in interviews, which addressed individual health in greater detail. Lastly, staff members were interviewed to determine their opinions of the barriers to health of the residents. Results: Preliminary results indicated a statistically significant correlation between women's perception of their overall diet and the number of fruit servings consumed daily ( $r_s=.52$ ,  $p=.009$ ). There was no significant correlation between access to healthy food, and the amount of healthy consumed. Through interviews the greatest barrier discussed was the expense of healthy food. Conclusion: Results indicate that although perceptions of diet may be related to actual consumption, perceived access to nutritional foods may not be related to daily intake levels of healthy foods among low-income women. However qualitative data expresses that cost of healthy food is the ultimate barrier.

Poster # 164

**The Association of Medication Compliance and Health among People with HIV***Andrea Smith*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

This study will highlight the reduction in the instances of detrimental health consequences in patients who remain compliant on medication. Understanding this benefit will allow clients to make more informed decisions regarding medication compliance. Methods: Through an analysis of secondary data, four physical health factors were compared between two groups of HIV positive subjects – one comprised of medication-compliant individuals ( $n=71$ ) and another group of non-compliant individuals ( $n=35$ ). Analyses compared measures of patient health between the two groups. Results: There is a positive relationship between the measured health scores and compliant patients

( $\chi^2(10)=14.00$ ,  $p<.001$ ). Data analysis shows that 100% of compliant patients had a higher GAF, a stable BMI, a CD4 count at or above goal, and undetectable viral load. Conclusions: Based on the findings of the study, medication compliance plays a significant role in the improved health of patients with HIV. This study will serve as further evidence of the importance of medication compliance, as it relates to improved health outcomes in HIV positive individuals.

Poster # 165

### **Examining Patient Satisfaction in a Community Pediatric Clinic in East Tennessee**

*Allison Vargo*

Student's Department: Social Work

Faculty Mentor: Matthew Moore

Efficacious community clinics value the viewpoint of their patients and respond to adequately meet patient requests and needs. One clinic operating in a low socio-economic status community in East Tennessee lacks the resources and expertise necessary to properly analyze patient satisfaction surveys. It is hypothesized that more females than males will report higher satisfaction, and those of non-white race will report lower satisfaction than those that identify as white. Methods: Patient satisfaction surveys (N=190) were collected from September 2014 through February 2015. Anonymous surveys were comprised of 27 Likert-scale items indicating the parent or caregiver's satisfaction with the care provided by the clinic. A chi-square test was used to determine patient satisfaction. Results: A chi-square test was run and a significant relationship was found between race and their satisfaction about their ability to get in and be seen, ( $\chi^2(2,N=190)=6.27$ ,  $p<0.05$ ). Non-white patients reported less satisfaction in being able to get in and be seen. There was no significant relationship between gender and patient satisfaction of the time the clinic is open, ( $\chi^2(2,N=190)=2.72$ ,  $p=0.256$ ) Conclusions: Implications from the survey analysis results will offer suggestions to the community pediatric clinic, and pave the way for interventions/preventions.

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Mccarty, Macy	146	College of Architecture and Design
Mccarty, Spencer	146	College of Architecture and Design
Mcginnis, Ashleigh	128	College of Arts & Sciences
McLaughlin, Elizabeth	231	College of Nursing
McMillan, Jay	24	College of Engineering
Mcnamara, Heather	78	School of Art
Mcnamara, Heather	83	School of Art
Meidl, Peter	103	College of Arts & Sciences
Mejia, Maria	208	College of Education, Health, and Human Sciences
Melton, Chad	122	College of Arts & Sciences
Mench, Lauren	228	College of Nursing
Miceli, Michael	1	College of Arts & Sciences
Midgett, Nathaniel	146	College of Architecture and Design
Miller, Michelle	243	College of Nursing
Miller, Sean	141	College of Architecture and Design
Miller, Therese	227	College of Nursing
Millis, Christopher	65	College of Arts & Sciences
Minecci, Allen	87	School of Art
Miselem, Norma	33	College of Engineering
Missimer, Sarah	75	College of Communication and Information
Mitchell, Micah	80	School of Art
Moon, Tayler	231	College of Nursing
Moore, Ellen	24	College of Engineering
Moore, Isaac	243	College of Nursing
Moore, Michael	232	College of Nursing
Moran, Hayley	204	College of Education, Health, and Human Sciences
Morse, David	59	College of Arts & Sciences
Moser, Devon	222	College of Nursing
Mott, Elisha	233	College of Nursing
Mottern, Rachel	128	College of Arts & Sciences
Mulitauaopele, Zachary	141	College of Architecture and Design
Murphy, Amanda	162	College of Social Work
Murphy, Benjamin	10	College of Communication & Information
Murray, Joshua	<b>146</b>	College of Architecture and Design
Nagel, Kaitlyn	80	School of Art
Naik, Dhara	94	College of Arts & Sciences
Namiotkiewicz, Allan	19	School of Art
Nasab, Armand	142	College of Architecture and Design
Neal, Taylor	231	College of Nursing
Nebenfuehr, Benjamin	66	College of Arts & Sciences
Nelli, Garrett	143	College of Architecture and Design
Ness, Anna	25	College of Engineering
Newport, Kalyn	80	School of Art

Nguyen, Thanh	23	College of Nursing
Nipp, Peyton	80	School of Art
Nkem, Cynthia	209	College of Education, Health, and Human Sciences
Oakley, Alex	33	College of Engineering
O'Banion, Joshua	129	College of Arts & Sciences
O'Hare, Megan	163	College of Social Work
Oldham, Colton	56	College of Engineering
O'Leary, Coleen	152	College of Architecture and Design
Oliff, Kathryn	212	College of Nursing
Ou, Shih-Huei	229	College of Nursing
Owens, Christina	144	College of Architecture and Design
Ownby, Miles	172	College of Agricultural Sciences and Natural Resources
Palmer, Cody	173	College of Agricultural Sciences and Natural Resources
Parham, Lucy	234	College of Nursing
Parker, Sara	53	College of Engineering
Parrish, Thomas	229	College of Nursing
Parrott, Anthony	80	School of Art
Pasley, Alex	137	College of Architecture and Design
Patel, Jenny	53	College of Engineering
Pavlik, Miah	221	College of Nursing
Pearson, Brooke	104	College of Arts & Sciences
Peck, Meredith	177	College of Agricultural Sciences and Natural Resources
Pedigo, Miranda	80	School of Art
Plymill, Austin	52	College of Engineering
Pomeroy, Catherine	225	College of Nursing
Porter, Robert	182	Haslam College of Business
Prentiss, Tyrel	95	College of Arts & Sciences
Pressley, Merrell	235	College of Nursing
Pressley, Savannah	224	College of Nursing
Prevost, Amanda	179	Haslam College of Business
Pugmire, Emma	92	College of Arts & Sciences
Quayle, Jeremy	23	College of Nursing
Quillen, Autumn	236	College of Nursing
Raffanti, Gina	<b>148</b>	College of Architecture and Design
Ralston, Georgia	180	Haslam College of Business
Ramos, Greyson	111	College of Arts & Sciences
Raykowitz, Alexandra	90	School of Art
Reineri, Liza	181	Haslam College of Business
Reynolds, Campbell	67	College of Arts & Sciences
Reynolds, John	42	College of Engineering
Reynolds, Tonya	221	College of Nursing
Richards, Jessie	169	College of Agricultural Sciences and Natural Resources
Ridley, John	187	Haslam College of Business
Roach, Jordan	68	College of Arts & Sciences
Rogers, Brandon	23	College of Nursing
Rogers, Katie	28	College of Engineering

Ross, Kerri	80	School of Art
Roth, Journey	145	College of Architecture and Design
Roth, Journey	146	College of Architecture and Design
Rowan, Brandon	229	College of Nursing
Ruiz, Jonathan	142	College of Architecture and Design
Ruiz, Jonathan	146	College of Architecture and Design
Rule, Samuel	191	Haslam College of Business
Rumsey, Tatum	153	College of Architecture and Design
Russell, Micah	20	School of Art
Rust, Mikah	57	College of Engineering
Saleh, Fadi	3	College of Arts & Sciences
Salvador, Victoria	87	School of Art
Samarin, Lindsay	220	College of Nursing
Sanders, Austin	172	College of Agricultural Sciences and Natural Resources
Sandor, Joseph	80	School of Art
Sawyer, Clara	234	College of Nursing
Schefano, Antonio	205	College of Education, Health, and Human Sciences
Schmid, Laura	234	College of Nursing
Scott, Macvan	147	College of Architecture and Design
Shaw, Kaitlyn	88	School of Art
Shedd, Joseph	137	College of Architecture and Design
Shpik, Alexandra	25	College of Engineering
Simmerman, Richard	64	College of Arts & Sciences
Slayden, Kylie	237	College of Nursing
Smith, Andrea	164	College of Social Work
Smith, Cary	54	College of Engineering
Smith, Dara	170	College of Agricultural Sciences and Natural Resources
Smith, Lauren	228	College of Nursing
Smith, Michael	99	College of Arts & Sciences
Smith, Patrick	100	College of Arts & Sciences
Speck, Lauren	238	College of Nursing
Speed, Alexander	203	Haslam College of Business
Steinmetz, Ashley	239	College of Nursing
Stonebrook, Cole	11	College of Engineering
Storms, Kira	240	College of Nursing
Stover, Mikhayla	126	College of Arts & Sciences
Stuart, Meghan	118	College of Arts & Sciences
Stuck, Austin	75	College of Communication and Information
Sullivan, Jerry	148	College of Architecture and Design
Tabor, Samuel	11	College of Engineering
Taylor, Savanna	233	College of Nursing
Terheggen, Logan	37	College of Engineering
Thomas, Myles	217	College of Nursing
Thomas, Taylor	98	College of Arts & Sciences
Thompson, Elizabeth	240	College of Nursing
Tipton, Jordan	183	Haslam College of Business

Todd, Hunter	148	College of Architecture and Design
Towe, Tucker	146	College of Architecture and Design
Trapnell, Andrew	194	Haslam College of Business
Tucker, Ashley	220	College of Nursing
Tudor, Adam	231	College of Nursing
Vacanti, James	119	College of Arts & Sciences
Valk, Jillian	184	Haslam College of Business
Vargo, Allison	165	College of Social Work
Varriano, Louis	120	College of Arts & Sciences
Vawter, Weston	2	College of Arts & Sciences
Veazie, Eleanor	84	School of Art
Vernich, Ryan	25	College of Engineering
Vilela Martins Lipman, Marcelle	38	College of Engineering
Vogel, Katherine	212	College of Nursing
Walker, Vincent	17	School of Art
Weiskittel, Taylor	35	College of Engineering
Welsh, Rachel	124	College of Arts & Sciences
Whitaker, George	171	College of Agricultural Sciences and Natural Resources
White, Benjamin	73	College of Arts & Sciences
White, Valerie	243	College of Nursing
Whitt, Kendall	113	College of Arts & Sciences
Wilkins, Jared	148	College of Architecture and Design
Wilkinson, Alanna	89	School of Art
Williams, Chandler	227	College of Nursing
Williams, Christopher	58	College of Engineering
Williams, Taylor	231	College of Nursing
Willis, Lashonna	225	College of Nursing
Wilson, Benjamin	175	College of Agricultural Sciences and Natural Resources
Wimberly, La'Bria	80	School of Art
Winstead, Abigail	75	College of Communication and Information
Woodward, Benjamin	241	College of Nursing
Woodward, Mitchell	23	College of Nursing
Worsham, Bethany	<b>242</b>	<b>College of Nursing</b>
Wray, Kaitlyn	74	College of Arts & Sciences
Wright, Elea	90	School of Art
Wyatt, Rachael	243	College of Nursing
Young, Joseph	185	Haslam College of Business
Youngquist, Erika	114	College of Arts & Sciences
Zavala, Brayan	75	School of Art
Zavala, Brayan	77	School of Art
Zelem, Hayden	81	School of Art

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**DOMINA**  
Julie Rich.

**Abstract**  
*Schizosaccharomyces pombe*, is an excellent organism for studying cell growth and division due to its small size and the fact that it can be imaged. A cell divides by binary fission until mitosis, after which it produces two daughter cells. The old end of the cell is the old end, and the new end of the cell is the new end. In the previous generation is the old end. In the new generation, the old end, which is dominant, grows only after the cell has divided. The phenomenon called NETO, a small GTPase, is the primary regulator of cell division in eukaryotes. CalcK2, the old end, which is dominant, grows only after the cell has divided. What makes the old end v... is unknown.

CalcK2 is activated by the *gef1* deletion mutants which data suggests that the old end of the previous generation. The memory of growth that determines the old end is also inherited...

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