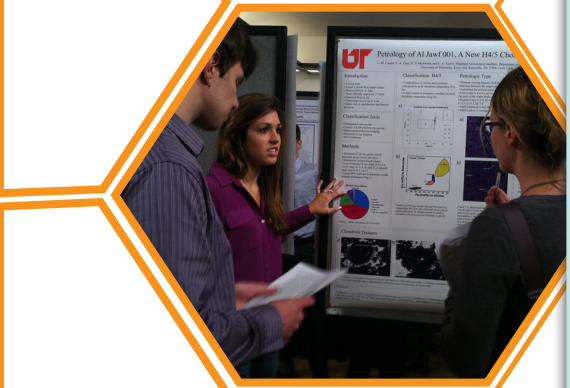
21st Annual

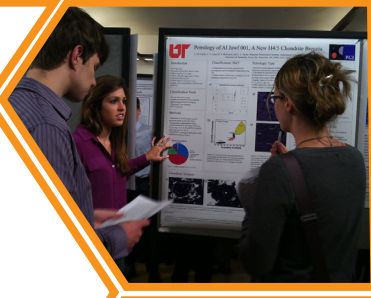
ABSTRACT BOOK

EURēCA

Exhibition of Undergraduate Research and Creative Achievement

2017





THE UNIVERSITY OF TENNESSEE KNOXVILLE

UNDERGRADUATE RESEARCH

EURēCA 2017
Online Abstract Book

Contents

This abstract book contains the collected works of 546 students presenting 333 entries in the 2017 Exhibition of Research and Creative Achievement (EURēCA).

Student Abstracts by Judging Discipline

College of Agricultural Sciences and Natural Resources

Poster # 257

Sorghum phenolic extracts: chemical characterization and biological activity determination

James Jordan Bradwell

Student's Department: Food Science and Technology Faculty Mentor: Dia, Vermont

Red sorghum contains phytochemicals such as 3-deoxyanthocyanidins and flavonoids with reported health benefits. The objective was to determine the chemical composition of sorghum phenolic extracts that were extracted with acidified methanol and separated into co-pigments and anthocyanin fraction by chromatographic procedure. In addition, the ability of sorghum extract to modify activation of the inflammasomes, a macromolecular protein complex involved in several malignancies, was evaluated. The total polyphenols, total flavonoids and total anthocyanins of the sorghum phenolic extract was quantified and phenolic profile was determined by high performance liquid chromatography. The ability to modify the inflammasomes was evaluated using THP-1 human macrophages as an in vitro model. Treatment of sorghum phenolics in lipopolysaccharide-primed and adenosine triphosphate-activated THP-1 human macrophages resulted in reduction in IL-1β and IL-18 secretion. Our study showed the potential of sorghum phenolics to serve as a chemopreventive agent against diseases associated with aberrant activation of the inflammasomes.

Poster # 264

Acoustic Monitoring of American Woodcock

Evan J Buck

Student's Department: Forestry, Wildlife/Fisheries Faculty Mentor: Buehler, David

The American Woodcock (Scolopax minor) has shown steady population declines since monitoring efforts were started in 1968 (Kelley, Williamson, and Cooper 2008). Male woodcock begin courtship displays in January; they are very vocal, making detection for monitoring purposes possible. Since 1968, observers have conducted singing male surveys along specified routes as part of the Singing Ground Survey (US Fish & Wildlife Service 2017). This method of survey is time-consuming and only allows for one sampling period per year. In spring 2016 and 2017, we conducted a study comparing the effectiveness of acoustic recorders and human observers for monitoring woodcock. Recorders were deployed February-May, and counts were conducted by observers comparing the effectiveness of the two methods. We used this data to determine the detection range of the recorders, and then formed an index between the two methods. The result is an efficient and accurate method of monitoring woodcock populations using acoustic recorders. This eliminates many of the shortcomings of traditional human-based point count surveys for monitoring woodcock, and will hopefully result in more effective management of the species across its range.

Poster # 249

Effect of Environmental Weathering on Biodegradation of Plastics

Christina Danielle Cowan-Banker

Student's Department: Biosystems Engr/Envr Science Faculty Mentor: Hayes, Douglas

Plastic mulch films benefit farming practices by reducing erosion, increasing soil moisture, and increasing yield in the production of fruits and vegetables. Conventional polyethylene mulches are difficult to dispose of, placing negative impacts on the environment and economically burdening farmers. Biodegradable mulches (BDMs) can be tilled into the soil after use for on-site decomposition, potentially lessening environmentally impacts. The objective of this study was to compare the impact of environmental weathering on the biodegradability of an experimental BDM prepared from a mixture of polylactic acid and polyhydroxyalkanote (PLA/PHA), two polymers derived from natural resources, and BioAgri, a commercially available mulch film (Biobag Americas, Dunedin, FL) consisting of a polyester/starch blend. Tightly sealed mason jars served as incubators, each containing soil and small ($1cm2$) pieces of mulch. The jars were kept at 27°C with the moisture retained. An infrared gas analyzer measured the CO2 evolution verse time. The rate and

extent of biodegradation for weathered mulches was greater than for un-weathered mulches, particularly for PLA/PHA. The cellulose control has shown the greatest CO2 evolution, with roughly two and three times the biodegradation rate of weathered BioAgri, respectively.

Poster # 248

Identifying the oviposition preferences of Aedes mosquitoes

Andrew C Dixson

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Trout Fryxell, Rebecca

La Crosse virus, the causative agent for La Crosse encephalitis, is transmitted to humans by the bite of an infected Aedes mosquito. This disease is primarily diagnosed in children and causes encephalitis, seizures, coma, and paralysis. Knowledge of the oviposition (egg-laying) behavior of Aedes mosquitoes in east Tennessee is important because it can inform strategies to control and monitor populations of likely vectors to minimize public health risk. Our objective was to identify the oviposition preferences of Aedes mosquitoes by comparing oviposition traps among eighteen sites across Knox County during the 2016 mosquito season. At each site, one black and one white oviposition cup containing seed germination paper and standing water were set weekly. After papers were collected, eggs were identified to species and counted. A majority of the identified eggs were Ae. japonicus and Ae. albopictus, two accessory vectors of La Crosse virus and both are invasive mosquito species. While trap color was not a significant factor determining oviposition preference, Aedes mosquitoes were heterogenous across the landscape by time and space. This research is critical for developing Aedes surveillance programs as other arboviruses transmitted by this genus include dengue fever, yellow fever, chikungunya virus, and Zika virus. Authors: Andrew Dixson*1, Kelsey Waterson*1, Simone Yates*1, David Theuret1, Dave Paulsen1, Ronnie Nease2, Nathan Jackson2, and Rebecca Trout Fryxell1

1Department of Entomology and Plant Pathology, University of Tennessee; 2Department of Health, Knox County Tennessee. *authors contributed equally to the work

Poster # 260

Impact of legume cover crops on phosphorus cycling in organic cropping systems

Zachary Outlaw Fox

Student's Department: Plant Sciences Faculty Mentor: Butler, David

Cover crops are used in agriculture to provide beneficial services to cropping systems, including control of soil erosion and improvements in chemical, physical and biological soil properties. Legume (Fabaceae) species are commonly used as cover crops for their role in biological nitrogen fixation but may also affect phosphorus cycling through a range of adaptations that improve solubilization and uptake of sparingly soluble soil P. Five commonly used cool season legume cover crops (Trifolium incarnatum, Vicia villosa, V. sativa, Pisum sativuum, Lupinus albus) were seeded in the fall of 2014 at UT's Organic Crops Unit in mixture with cereal rye (Secale cereale) in field plots arranged in a randomized complete block design with four replicates. A cereal rye monoculture was included as a control. In spring 2015, cover crop biomass was either incorporated ('tilled') or left at the soil surface ('rolled') and grain sorghum was seeded in all plots. Cover crop biomass and cover crop phosphorus (P) uptake, crop P uptake, extractable soil P, and soil pH were evaluated. Total aboveground cover crop biomass (average biomass 1kg m-2) and total P in biomass did not differ significantly among treatments. Total P in aboveground legume biomass was greatest in plots with V. villosa (448 mg P m-2) and similar among all other legumes (96 to 259 mg m-2). Sorghum P concentration did not differ among cover crop treatments but was less in rolled plots than in tilled plots. Soil pH and extractable soil P did not differ significantly among cover crop treatments in 2015, but was slightly lower in rolled plots compared to tilled plots (pH 5.6 vs. 5.7). Results suggest legume cover crops may alter P cycling but direct effects on crop production are likely limited, at least in the short term.

Poster # 168

The EZ-Lift: A Mechanical Lift-Assist for Rollover Protection Structures

Garrett Thomas Froula David Brice Gilliam, Madison Rhett Brummitt

Student's Department: Biosystems Engr/Soil Science Faculty Mentor: Ayers, Paul

A rollover protection structure (ROPS) is designed to protect vehicle operators during an overturn by absorbing the energy generated by the vehicle's weight when hitting the ground. The foldable ROPS, an innovation of the original two-post rigid ROPS, pivots on a hinge. This allows it to fold down from its upright position and fit in low-clearance areas. However, there is no efficient process to fold the ROPS; therefore, the ROPS is rarely lowered or raised. Operators need a device that allows them to actuate the ROPS while seated to counteract the inefficient process. Thus, the University of Tennessee ROPS Team developed the EZ-Lift, a mechanical lift-assist for ROPS. Design restraints were dictated by ergonomic and design standards set by the Society of Automotive Engineers (SAE) and the International Organization for Standardization. These standards set design criteria such as operator safety zones and exertion forces. For example, the EZ-Lift's maximum operator exertion force of 50 N is less than 100 N, therefore it complies with SAE standard J1814. The University of Tennessee's Facility Services Department implemented the EZ-Lift on their Exmark mowers to critique user-friendliness. Results prove the EZ-Lift overcomes the inefficient actuation process, and meets both ergonomic and design standards.

Poster # 259

Proof-of-Concept Study for Rapid Detection of Zika Viral RNA via DNA Biosensor

Michelle Hoang

Student's Department: Interdisciplinary Programs Faculty Mentor: Eda, Shigetoshi

Zika virus is a flavivirus that causes disease in humans. Zika infection has been linked to severe medical conditions such as Guillain-Barre syndrome in adults and microcephaly in newborns of mothers infected during pregnancy. The possibility of severe consequences has led to the need for new diagnostic techniques to replace the current inefficient and time consuming methods. We conducted a proof-of-concept study to demonstrate that a selective DNA-biosensor with peroxidase activity is able to specifically detect DNA molecules with Zika virus-specific sequence (zDNA). Our approach utilizes a G-quadruplex hemin binding DNA oligomer, an effective signaling mechanism that forms a DNAzyme with peroxidase activity which catalyzes oxidation of tetramethylbenzidine (TMB), in combination with a proximity dependent DNAzyme formation mechanism. The enzymatic activity of the DNAzyme, termed Proxzyme, is activated only in the presence of zDNA. In a series of experiments, we optimized (1) reaction buffer composition, (2) length of spacer sequence, and (3) DNAzyme type. The developed zProxyzyme is proven to selectively detect zDNA in the nano-molar range in under 16 minutes colormentrically. The biosensor shows promising selectivity and will be paired with an on-site diagnostic device previously developed by our lab that utilizes alternating current electrokinetic (ACEK) based capacitance sensing to decrease the limit of detection.

Poster # 258

BG-4, a novel bioactive peptide from Momordica charantia, inhibits lipopolysaccharide-induced inflammation in THP-1 human macrophages

Lynsey D. Jones

Student's Department: Food Science Faculty Mentor: Dia, Vermont

Chronic inflammation has been associated with development of difference malignancies including neurodegenerative diseases and cancer. Naturally occurring compounds with anti-inflammatory effects is an attractive way to prevent diseases associated with inflammation. BG-4 is a novel peptide isolated from the seeds of bitter melon (Momordica charantia) with potent trypsin inhibitory activity. The objectives of this research is to evaluate the capability of BG-4 to inhibit lipopolysaccharide(LPS)-induced inflammation in THP-1 human macrophages. THP-1 human macrophages were pre-treated with different concentrations of BG-4 for 8 h and challenged with LPS for 16 h. The anti-inflammatory effects were evaluated by measuring the secretion of pro-inflammatory cytokines IL-1β, IL-6 and TNF-α and compared to untreated THP-1 macrophages. The mechanism of action was explored using the NF-κB signaling pathway. BG-4 pre-treatment led at 50 μg/mL reduced production of IL-1β by 65.8%, IL-6 by 88.4% and TNF-α by 50.7%. BG-4 also decreased the nuclear translocation of p65 NF-κB subunit as measured by immunofluorescence microscopy.

Our data indicates the potential of BG-4 to prevent diseases associated with aberrant and uncontrolled inflammation.

Poster # 253

Intercalation of Phyllosilicate Minerals By Tylosin: Influence of Solution and Exchange Phase Composition

Haley Ann Koziol

Student's Department: Environmental/Soil Science Faculty Mentor: Essington, Michael

Tylosin (Tyl) is a broad-spectrum antibiotic used to treat livestock. Only a small amount of Tyl is actually absorbed by the animal, while the remainder is excreted in urine and feces. Tylosin is a large molecule (~1,000 g mol−1) that bears a protonated methylamine group when solution pH < 7.5. Adsorption studies indicate that an important soil retention mechanism for Tyl is cation exchange. Further, exchange isotherms show the Tyl+ is preferred by soil and smectite clays, relative to Na+ and Ca2+. These studies also show that adsorbed Tyl is distributed between non-exchangeable and exchangeable forms, and that adsorbed Tyl reduces the CEC of clay minerals. The objective of this study was to determine the location of adsorbed Tyl in Na- and Ca-saturated source clays (STx and SWy) and soil smectite. Solutions having differing Tyl-Na or Tyl-Ca ratios (with a total normality of 4 mM) were equilibrated with Na- or Ca-saturated solids. X-ray diffraction was then preformed to determine d-values of the 00l spacing. The d-value of STx increased from 1.26 nm for Na+-saturated to 3.13 nm when Tyl+ was 75% of the exchange complex. Similarly, the d-value of SWy increased from 1.24 nm to 2.69 nm. The impact of Tyl+ on the d-value of Ca2+-saturated clays was minor due to the competitive nature of Ca2+ for exchange sites. The d-value of STx increased from 1.54 nm for Ca2+-saturated to 1.72 nm when Tyl+ was approximately 10% of the exchange complex. Similarly, the d-value of SWy increased from 1.51 nm to 1.69 nm. In the Na-saturated soil clays, the d-value shifted from 1.30 nm to approximately 2.7 nm when Tyl+ occupied 40% of the exchange complex. The d-value shifted from 1.45 nm to 1.6 nm when Tyl+ occupied 10% of the exchange complex in Ca-saturated soil clays. The findings indicate that Tyl is intercalated into smectite interlayers, affecting the environmental fate and bioavailability of the antibiotic.

Poster # 255

Effects of water cement ratio and improper handling on concrete cylinder strength

Chad Carter Lamon Brett J Holden

Student's Department: Environmental/Soil Science Faculty Mentor: Drumm, Eric

As a quality control measure during construction, cylinders of concrete are cast during the placement process and later tested for strength. This experiment was performed to determine how water cement ratio affects the strength of concrete. Also investigated was how improper treatment of the cylinders on the jobsite can weaken the concrete, yielding erroneous reporting of strength and causing delay or additional corrective actions. The strength of the concrete was measured by casting 6-inch diameter by 12-inch-tall cylinders. Four groups participated in the experiment, each casting three "good" cylinders and one or two "bad" cylinders. Each group mixed their own batches of concrete with the exact same proportion of course aggregate, fine aggregate, and cement. The only varying factor in the concrete batches was the amount of water added to the mixture. After the cylinders were cast each team would label their three "good" cylinders and their one to two "bad" cylinders. After setting for 24 hours, the "good" cylinders were cured in water for 28 days following standard practice. To investigate the effect of improper handling and care of concrete cylinder on the jobsite, the "bad" cylinders were exposed to four different potentially harmful environments or forces. Team one dropped their cylinder from a height of approximately 3 feet, team two left their cylinder out of the curing water, team three placed their cylinder in a freezer for 24 hours, and team four placed their cylinder in an oven for 24 hours. After 28 days all concrete specimens were tested for strength using a compression machine. Results from the experiments are presented to illustrate the effect of water cement ratio on strength, and how the improper handling affected the "bad" samples. This study was part of a class project from BsET 270 Behavior of Construction Materials.

Poster # 261

Bigger targets are easier to hit: facile chloroplast genome transformation in Nicotiana tabacum cv. Petit Havana with giant chloroplasts.

Jessica Slade Layton
Student's Department: Plant Sciences Faculty Mentor: Stewart, Neal

Transgene confinement of genetically modified plants has proven to be a taxing challenge for plant biotechnology. Chloroplasts, however, have their own genome in multiple copies per plastid, which is exclusively maternally inherited in most plant species. Genetic engineering of the chloroplast genome can provide high levels of gene expression without silencing. Despite these benefits, chloroplast transformation remains extremely inefficient. Recent studies have shown that over expression of AtFtsZ1, a gene responsible for regulating chloroplast division in Arabidopsis, can produce an abnormally large chloroplast known as a macrochloroplast. These enlarged chloroplasts provide a larger target for transformation and may help increase chloroplast transformation efficiencies. In this project, we overexpressed AtFtsZ1 in Nicotiana tabacum cv. Petit Havana via Agrobacterium-mediated transformation, which produced plants that exhibited the desired macrochloroplast phenotype. Plastid transformation was then performed using a chloroplast transformation vector containing the PpsbA and Prrn native chloroplast promoters which drive expression of a green fluorescent protein reporter gene and the aadA spectinomycin resistance gene, respectively. The results of this project are aimed to assess whether macrochloroplasts might be useful for more facile tobacco chloroplast transformation with the ultimate goal of translating chloroplast transformation to other species.

Poster # 250

EVALUATION OF FOLDABLE TRACTOR ROLL-OVER PROTECTIVE STRUCTURES (ROPS) CLEARANCE

Luke Thomas Martin
Student's Department: Biosystems Engr/Soil Science Faculty Mentor: Ayers, Paul

Tractor rollovers are a leading cause of death in the agricultural industry. While rollovers continue to happen, Roll-Over Protective Structures (ROPS) have shown great ability to prevent or reduce the casualties and injuries associated with rollover events. One authority on the subject even goes so far as to claim that "that fatality rates due to tractor overturns could be reduced by a minimum of 71% if all tractors in the U.S. were equipped with ROPS," (NIOSH, 2009). The potential of this promising statistic has been devalued slightly due to the misapplication of foldable ROPS by leaving the ROPS in the folded down position. Foldable ROPS provide a practical solution to various issues faced by tractor operators. However, a ROPS is not meant to be used in the folded down position, and there are engineering standards that should be used to determine if a folded down ROPS actually offers any protection. This study determined the operator protection provided by ROPS in the extended and the folded positions relative to the applicable engineering standards. To accomplish this, six different sized tractors with different ROPS were analyzed to determine the measurements required to calculate the protection that the tractor and ROPS combination provides in both positions, folded and extended. These calculations yielded results that show consistent trends among all tractors measured. With regards to the engineering standards, all tractors measured provide complete protection when in the upright, extended position and did not provide adequate protection when in the folded position. These results provide useful insights into engineering standards and recommendations.

Poster # 265

Histomonas ELISA

Jessica Martinez
Student's Department: Forestry, Wildlife/Fisheries Faculty Mentor: Gerhold Jr, Richard

Histomonas meleagridis is a protozoan parasite of avians and is the causative agent in Histomoniasis, commonly known as Blackhead Disease, in gallinaceous birds. Current methods for diagnosing the presence of H. meleagridis are limited to parasite culture or Polymerase Chain Reaction (PCR) to amplify target DNA. This project aims to develop an enzyme-linked immunosorbent assay (ELISA) for faster and more sensitive diagnosis of Histomonas infections. Cultures of H. meleagridis parasites were purified, and surface antigens were extracted using a spectrum of chemical solutions. The various antigen solutions were subjected to an ELISA, with serum from birds immunized for H. meleagridis as positive controls. The ELISA was measured for absorbency differences between positive and negative control serum

samples. Preliminary results indicate Propanol as a promising treatment; however conclusive data necessitates additional ELISA analysis. Histomoniasis threatens the health of both wild and domestic bird populations. Control of this disease relies on quality management and diagnostic techniques. This ELISA will aid scientist, managers, and veterinarians in the study and eventual control of this disease, and also allow researchers the opportunity to understand the impact of Histomonas outbreaks and elucidate the attack rate of the parasite.

Poster # 254

Selection of mycorrhizal symbionts in response to abiotic stress and competitive interactions between Poa annua and Juncus drummondii

Sarah Louise Ottinger

Student's Department: College of Agricultural Sciences and Natural Resources Faculty Mentor: Henning, Jeremiah

To thrive and be healthy, plants require certain macronutrients that are difficult to obtain by physiological mechanisms alone. Plants rely on mutualistic relationships with mycorrhizal fungi to obtain these limiting nutrients. Arbuscular mycorrhizal fungi (AMF) and dark-septate endophytes (DSE) are plant-associated fungi that often co-colonize root space, but may provide different nutrients to plants. Patterns of co-existence between AMF and DSE are commonly observed in plant roots, however it is unknown if plants mediate co-existence to alleviate nutrient stress. We hypothesized that plants would allocate resources to fungal partners that alleviated nutrient stress, for example, higher AMF when phosphorus limited, higher DSE when nitrogen limited. Additionally, because plant species differed in their ability to acquire limiting nutrients and benefits they received from fungal partners, we hypothesized that changes in fungal partners would alter interspecific and intraspecific competition. To test these hypotheses, we conducted a greenhouse experiment where seedlings of Poa and Juncus were grown with itself and with each other in soils that differed in availability of nitrogen and phosphorus resources. Surprisingly, we found differences in nutrient availability did not alter performance of either grass, although competitive interactions were strong. Juncus consistently out-performed Poa in every treatment, and Juncus performed better against Poa than when grown with itself. Plant-plant interactions as well as their interactions with the abiotic environment will scale to shape plant community composition and ecosystem function. In the high elevation ecosystems where Poa and Juncus co-occur, Juncus is typically the dominant plant species, likely because in the extreme conditions they live, Juncus is a superior competitor for limiting nutrients. As global change alters temperature and precipitation regimes and agricultural use of fertilizer introduces added nutrients to natural systems, changes in communities can scale up to affect ecosystem function on a wide-spread scale.

Poster # 262

Bioconfinement: Pollen and seed sterility in genetically engineered plants

Francisco Javier Palacios Kelsey Harrell

Student's Department: Plant Sciences Faculty Mentor: Stewart, Neal

Over the past two decades genetic engineering has facilitated crop improvement; however, there is concern that these transgenic plants may transfer new traits to wild relative species though hybridization. The use of bioconfinement techniques can potentially reduce or eliminate unintended gene flow. The goal of this project is to evaluate a bioconfinement technique where transgenic pollen or seed is rendered sterile through tissue-specific expression of a cytotoxic protein. In this system, expression of the restriction endonuclease EcoRI is driven by pollen or seed specific promoters in the model plant Oryza sativa (rice). Agrobacterium-mediated transformation was performed with a vector that contained an orange fluorescent protein, hygromycin resistance gene, and a seed or pollen promoter used to drive EcoRI expression. Genetically engineered plants were regenerated, screened on hygromycin selection media, visually screened for orange fluorescence, and PCR confirmed for the EcoRI gene. The PCR and fluorescence results indicated the successful transformation of seventeen transgenic plants. To determine bioconfinement efficacy, transgenic plants will be first self-pollinated to determine the transgene segregation ratio and then subsequently crossed to nontransgenic plants for comparison. If this system confers bioconfinement, we can potentially eliminate or reduce the risk of unintended gene flow from genetically engineered plants.

Poster # 251

Evaluation of fuel characteristics of legacy fine coal refuse

Taylor Douglas Spivey
Student's Department: Biosystems Engr/Soil Science Faculty Mentor: Abdoulmoumine, Nour

In 2015, the United States generated 4 trillion kilowatt hours of electricity, 33% of which was generated by coal fired power plants. Raw coal is processed near the mine source, leaving behind particulate waste referred to as fine coal refuse (FCR), which is stored behind tall dams or refuse impoundments ranging from 200 to 700 feet in height. There are more than 1170 of these retention dams in the U.S. These impoundments, though typically safe, are subject to mechanical destabilization and failure, which results in harmful release of coal refuse into the environment. Re-mining these existing deposits of FCR could replace or reduce the need for additional underground and strip mine operations, and if these waste coal materials have sufficient economic value, re-mining may cover the cost of remediating these impoundments which would otherwise remain in place indefinitely.

The purpose of this study is to evaluate the fuel properties of legacy fine coal refuse deposits with depth below the surface to determine their suitability for thermochemical conversion in existing coal fired plants. Proximate analysis and thermogravimetric analysis of coal refuse samples obtained from a site in Kentucky was performed to determine moisture content, volatile matter content, ash content, fixed carbon, and thermal decomposition profiles in oxidative environment as functions of depth for coal refuse samples.

After performing proximate analysis on our samples, mean moisture, ash, volatile, and fixed carbon content were determined for each depth. Upon analysis, we observed a modest positive association between moisture and depth, a strong inverse relationship between ash content and depth, a moderate association between volatile content and depth, and no association between fixed carbon content and depth.

Poster # 247

Clinical and Subclinical Mastitis Causing Pathogens in Tennessee Dairy Cattle

Michelle Untch
Student's Department: Animal Science Faculty Mentor: Pighetti, Gina

Milk quality impacts the producers and consumers. Higher milk quality leads to a longer shelf life, improved cheese making ability, and improved taste. Milk quality can be severely impacted by intramammary infections which can result in mastitis. Identifying the common mastitis causing pathogens in milk samples collected from subclinical and clinical mastitis cases can assist the producer in managing mastitis. This can lead to improved milk quality, improved cow health, and reduced need for antibiotics to treat mastitis. This study investigates the prevalence of bacteria causing intramammary infection in dairy cattle of Tennessee. Milk samples were collected from 9 farms across Tennessee in February/March and in September/October 2016 resulting in 1231 subclinical and 245 clinical mastitis samples. The milk samples were cultured and colonies were biochemical tested to determine the types of organisms present. The most frequent mastitis causing pathogens for each type of mastitis, farm, and season will be evaluated. The top three subclinical pathogens isolated were coagulase-negative Staphylococci (11.78%), Staphylococcus aureus (5.61%), and Other (6.34%). The top three clinical mastitis organisms isolated were coagulase-negative Staphylococci (8.16%), Escherichia coli (7.35%), and Other (7.35%). An analysis of pathogen prevalence in late winter versus early fall also will be presented.

Poster # 263

Potential effects of engineered silver and copper nanoparticles on Oncorhyncus mykiss

Rebecca Van Balen
Student's Department: Forestry, Wildlife/Fisheries Faculty Mentor: Ripp, Steven

Silver nanoparticles (Ag-NPs) and copper nanoparticles (Cu-NPs) have become well known for their antimicrobial properties. This may be especially attributed to the increasing threat of disease outbreaks, making application of their antimicrobial properties particularly useful for disinfecting household items and medical devices, and even for purification of water. A potential hazard that may result from excessive use of Ag-NPs and Cu-NPs is an increase in their

release into the environment, which could have serious consequences to both the environment and for organisms that may ingest and accumulate the nanoparticles.

To assess the indirect effects of nanoparticles on aquatic organisms, we conducted a study to evaluate changes in digestive health of the ecologically important rainbow trout, Oncorhynhcus mykiss, when exposed to increasing amounts of Ag-NPs and Cu-NPs. In addition, the fish were exposed to the metal compounds, silver nitrate (AgNO3) and copper sulfate (CuSO4). Evaluation of the DNA of the gut microbiome as time progresses will be used as an indicator of changes in overall digestive health. The consequences of the treatments will help determining if Ag-NPs, Cu-NPs or bulk metals are responsible for any occurring changes.

Poster # 256

Design, testing and analysis of ABS plastic model beams produced on the Pendergrass Library 3-D printer

Chappel Spencer Weitzel, Cameron Mccormack Mackle, Casey E Goins

Student's Department: Biosystems Engr/Soil Science Faculty Mentor: Drumm, Eric

The results of a class project from BsET 270 Behavior of Construction Materials are reported.. We first measured the strength of ABS plastic tensile coupons that were printed in the Pendergrass Library 3-D printer. Each team then designed a model plastic beam in CAD that could not exceed the dimensions of 6" long and 1" high. These beams were then printed on the 3-D printer, and tested in a third point loading to measure the breaking load. Each beam was then scored in terms of efficiency (load/weight) as well as the predicted capacity, which was based on measured tensile strength.

Poster # 252

Design of a Mobile Biochar Unit for On-site Conversion of Waste Biomass

Andrew Whitaker, Jacob Eric Parker, Rachael Anne Beaver, Andrew Wilson Lynch

Student's Department: Biosystems Engr/Soil Science Faculty Mentor: Abdoulmoumine, Nour

Construction sites often leave the disturbed soil in a barren condition after clearing the land of its natural biomass. It is common practice to then burn the waste biomass material generated in smoldering piles on-site. However, it can be utilized as an environmentally friendly and permanent soil amendment if converted to biochar, a porous carbon based soil amendment obtained through thermal conversion of biomass. The goal of this project is to design a mobile biochar production unit capable of converting waste biomass at construction sites into biochar as a substitute for expensive soil ameliorations or sod currently used. By conducting a thorough analysis of similar existing biochar production and gasification units, we designed a downdraft gasifier with the goal of maximizing biochar production while eliminating excess hazardous wood gases that are environmentally restricted in many locales. Our design can process up to 25,000 pounds of biomass per month, the equivalent of waste biomass generated by a typical 2.5 acre construction site. The resulting biochar will be suitable to amend the greenspaces at construction site at minimized cost while also providing an environmentally friendly and safer waste management alternative to the conventional open-burning approach practiced at many construction sites.

College of Architecture and Design

Poster # 25

Mini XP

Kimberlee Lauren Ballard, Torie Ann Buche, Sierra Denise Holder

Student's Department: Architecture Faculty Mentor: Goeritz, Hansjoerg

MINI XP is a theoretical project that develops an established corporate identity into an architectural design. The car brand MINI identifies as minimal, fun, cheeky, and unique. MINIs where born out of the need for compact city efficiency, and molded by Formula One's need for speed. The question arose: how can a piece of architecture imbed itself into a dense urban fabric, while also allowing for an experiential track? Looking into the future of the brand, and reflecting upon a scene from The Italian Job revealed two answers. The architectural project's physical track tunnels under a hill along the colorful San Francisco Bay, California. The immaterial track reaches out to the Golden Gate Park, Twin Peaks, or Lombard Street. MINI XP connects culturally to San Francisco by providing a platform for visitors to design

a tour of the city and a MINI to experience it with. Every MINI is tailored to express the individuality of the driver, while MINI XP designates virtual gallery spaces for local artists to express their individuality within an architectural setting. At the end of the project, the MINI EXPERIENCE CENTER of San Francisco was realized to be a place for visitors to experience MINI in a way that architecturally amplifies their conception of the brand.

Poster # 26

Salk Institute

Sydney Ann Bittinger, Emily R Gowder

Student's Department: Architecture Faculty Mentor: Goeritz, Hansjoerg

After numerous iterations and red lines, we've come to create pages that accurately describe the visual and physical properties of the world renowned institute. Not only did we form an understanding of a space that we were once unfamiliar but we were able to share our knowledge with our classmates and the visiting professors. The conditions within the separate mechanical floors and the minimally connected towers for the offices create such unique spaces that were a vital part of the design of Louis Kahn. The custom rafters and capability to consistently update technological systems creates an ideal setting for scientific research. The offices accented with teak paneling fit in the facade like drawers in a shelf creating a clear distinction between the comfort of the offices and the purely brutalist polozan concrete. laboratories of the offices help note the location and difference in comfort between the offices and the all polozan concrete laboratories. The organization of separated mechanical floors and minimally connected towers containing offices create unique spaces that become a vital part of Louis Kahn's design

Poster # 27

Urban Quarter Organics

Rachel Christiane Elbon, Adam Jesse Smith

Student's Department: Architecture Faculty Mentor: Stevens, Kevin

As social and cultural trends in the world have changed over time, the need for food will remain a perpetual constant. Every individual – students, families, professors, and young professionals - shares the necessity for food. Located in Knoxville, TN, this design will address this need and will consist of four organisms dependent on each other to survive – a culinary research lab, experimental and farm-to-table restaurants, affordable housing, and an urban farm and future farming technologies. These four organisms will create a self-sustaining urban environment, or ecosystem, within a single block in Knoxville. This ecosystem will evolve with social and cultural trends from within the city to across the world, enabling the ecosystem to become a timeless addition to downtown Knoxville

Poster # 28

Identity of Scatter

Margaret Ellen Marie House

Student's Department: Architecture Faculty Mentor: Stuth, Tricia

Community is present where there are humans to operate it. Identity is linked to the awareness of a community to their own operations and their relative respect of these conditions. No longer (and arguably never) do communities, especially smaller ones operate centrally to their constituents. Rather they operate on a scattered nodal system, finding points of activity inherent to routine of community, not necessarily linked to spatial distribution or enforced hierarchies. Through the Smart Communities Initiative in the fall of 2016, these ideas about today's urban reality faced by smaller communities was investigated in the context of the community of Lenoir City. Through interview and observation, this project suggested utilizing existing patterns of the city to incite optimism and excitement about existing public spaces that are underutilized or overlooked but ripe with potential.

Poster # 29

Unite d'habitation

John C Huddleston, Leah Noel Cassetty
Student's Department: Architecture Faculty Mentor: Davis, Marleen

Prompted to generate a descriptive set of architectural drawings of a preexisting piece of design history, my partner and I, began to execute a case study through deductive reasoning in order to grasp the concept of how the architectural feat was achieved. With the help of historical documents and group intuition, we were able to come to a reasonable conclusion as to how the architect was able to achieve the design he strived to aesthetically produce, but still hold a reasonable building aspect that would make the imaginative dream possible. Unite d'habitation by Le Corbusier was an architectural piece that would forever be a brutalist mark on history but still have an elegant touch of finesse. Corb was a designer that was known for his excellence and his incomparable work that he included in his designs, and my partner and I were able to dissect a piece of his work through the use of this case study and begin to catch a glimpse of how a remarkable architect created pieces of history that would forever be known around the world.

Poster # 30

Investigating Terracotta Cladding - An Analysis of the Bechtler Museum's Enclosure

Michael Steven Lidwin, Rachel Kathlyn List
Student's Department: Architecture Faculty Mentor: Goeritz, Hansjoerg

A windowless façade becomes the inspiration for an experimentation of materials. Through the use of terracotta cladding, Mario Botta crafts a local landmark and structural masterpiece in his design of the Bechtler Museum of Modern Art. The Bechtler Museum is located in Charlotte, North Carolina, and appears as a giant terracotta-red cube in the downtown cityscape. Instead of including several exterior windows, Botta focuses on the materiality of terracotta to function as an attractive facade and as an effective enclosure system.

This research project analyzes structural and enclosure elements of Mario Botta's Bechtler Museum. Through diagramming the building in section, elevation, and axonometric form, this analysis documents the hidden components used to construct the museum. This analysis also chooses to focus on the exterior façade, because of its programmatic relationship to the museum as an exhibition space. By contrasting the skylights with the opaque façade, the Bechtler Museum presents a dichotomy of lighting conditions used to protect and display artwork.

This project is also as much about architectural drawing as it is about the design of the Bechtler Museum. By detailing structural and enclosure elements, this research analysis argues that understanding structure is best learned through diagramming and reinterpreting drawings.

Poster # 9

Disembodied Circle: A Twelve-Step Program

Macy Belle McCarty, Camille Elizabeth Lane
Student's Department: Architecture Faculty Mentor: Ambroziak, Brian

The exercise entitled Disembodied Circle1 is part of a one-hundred level course entitled Visual Design Theory. The problem allows young designers to engage a highly personal three-dimensional space, one that makes the often times more abstract processes of the design studio more tangible. The exercise provides a forum in which to examine the consequences of various physical conditions and question fundamental design decisions related to scale and site as well as appreciate various phenomenological determinants of place. The magic of this exercise lies in its absolute simplicity, its ability to emphasize how subtle shifts in dimension can profoundly affect one's psychological reading of a space. In a relatively short period of time, students undergo a wonderful transformation from an interstitial state, that of the wall, to an external and then internal realization of an archetypal condition – the inscribed circle. It is the goal of the exercise's associated paper to generate a field manual that exploits this "twelve-step" strategy for spatial perception.

Poster # 31

vessels of relief

Elizabeth D Ott
Student's Department: Architecture Faculty Mentor: Moir-Mcclean, Tracy

2016 saw many disasters: Hurricane Matthew in the Caribbean and southern United States, wildfires in the east and west, and severe snowstorms in the north. Upon further research of disaster response, especially in flood-related issues, I found that many survivors did not completely recover until years later, both on a financial and emotional state. I then proposed to attack how we change our approach and methods of helping families in disaster areas and counteracting post-traumatic stress syndrome but also bettering those who are affected, the majority being in the low-income demographic.

As a response, the Sisters of the Ursuline Relief Mission was canonized. In a unit of three barges, Sisters will man the barges and respond to distress calls, traveling up and down the Mississippi River and down their tributaries. The Coast Guard comes in beforehand, establishing the residential pontoon bridge network system that connects to the barge units, which forms the community center for the survivors. This community center would evolve for the purpose that is seen fit, capable of housing the Sisters, providing recreational space, place for worship, and educational areas, among other things.

Essentially, this is an approach of implementing long-term assistance and rehabilitation when the traumatism of the natural disaster has fully affected the landscape and the people.

Poster # 32

Urban Revitalization and Environmentally Conscious Architecture: The Tennessee Concrete Association's New Headquarters

Allison Morgan Sonnenberg
Student's Department: Architecture Faculty Mentor: Davis, Thomas

Southeastern Nashville is growing rapidly and gaining energy. The leaders at the Tennessee Concrete Association purchased land in the area, and worked with a small group of UT students to develop the site as a bustling place for commerce, a unique living space, and an ideal place for business. Their focus was on showcasing concrete's many uses and technological advances, as well as creating an enjoyable and environmentally conscious collection of buildings and environments. The class divided into smaller groups, with each group creating and proposing a design for the site. My now-graduated partner, Cody Bancroft, and I worked closely with Leadership in Energy and Environmental Design (LEED) requirements to create a gathering space, two parking garages, and three buildings that would achieve a LEED platinum rating. Our site holds an apartment building that houses maker-spaces and a parking garage within it, an office building with the top floors planned specifically for the Tennessee Concrete Association, and a small building that serves as a workspace and demonstration headquarters for the association's presentations on uses and technological advances of concrete. Solar panels, plentiful plants, and environmentally conscious architectural elements used in the buildings all contribute to our LEED platinum compliancy.

Poster # 10

TVA Headquarters: Poetics of Constraint

Graham Colton Taylor, Joshua Alexander Murray, Casey David Myers
Student's Department: Architecture Faculty Mentor: Rose, James

Often a design is constrained by forces outside the designer's hands. As designers, we often resist these constraints and try to find a loophole or work-around to better fit our "needs." What if this was not the case? What if the design embraced these constraints as design drivers instead of resisting them?

For this project, Poetics of Constraint, the design team challenged not only ourselves, but also the norms of architectural expression by embracing the constraints as design drivers rather than limitations. The most immediate constraint is an existing garage, which is slated for demolition upon new construction. To be more environmentally conscious, the decision was made to keep the garage and adapt its program to compliment the new building. This decision led to the largest constraint: putting a 266,000sf program on a 9,000sf site. This program:site proportion would

have led to a building that was approximately 500 feet tall, a height out of place in Knoxville.

An elegant solution required the design to not be a mere extrusion, but a poetic response to the constraints. This resulted in the final building mass that is more than aesthetic, but also functional.

Poster # 33

Pictorial Inscription

Jonathan William Winfield Emily R Gowder

Student's Department: Architecture Faculty Mentor: Ambroziak, Katherine

Visual art is a universal language that has been a method of sharing events, thoughts, and ideas throughout history to groups of people large and small as a means for public visual communication. Street art, whether Images, paintings, sculptures, landscapes or even performance simply illustrate and communicate visual thoughts from not only the viewpoint of the artist but also through the pages of time and their historical context versus the traditional art, which is usually displayed within galleries and museums. The meaning of art to a community can vary between these forms of representation. Though street art has evolved over time from cave paintings to elaborate murals painted on walls that span multiple stories, these types of art pieces express the one thing, which always seems prominent, pride from coming from producing the work and what it represents. The scope of our investigation focuses on two-dimensional painted graphics, specifically large-scale street art murals and graffiti art created in public locations like ally ways or corners of building. Our proposal will analyze these two forms by understanding who painted or created them and why, and whether they were sanctioned and planned or unsanctioned and subversive. Our investigation is a spatial Memory study that will explore the street artwork within Knoxville concerning the themes of location, time, composition, and the message content of the art, which is formulated to tell the narrative of city through the eyes of the beholder.

Poster # 34

The Oasis

Makenna Breann Wood

Student's Department: Interior Architecture Faculty Mentor: Teston, Liz

The Oasis features a sustainable urban restaurant design that submerges Chinese culture within Knoxville. The sustainability factor of the restaurant is offered in the ecofriendly green wall that immerses customers in a natural setting. The green wall uses a grey water system that collects water from the roof and supplies it to the plants. Therefore, water is effectively used in a pragmatic way. Green walls offer many health benefits and advantages to humans. Naturally, green walls emit excess oxygen and help reduce harmful toxins in the air. They create a cleaner environment by acting as a natural air filter. This can cause a significant health increase in humans and produce a lively environment. This green wall not only provides natural invigoration; but, also serves as an acoustic barrier. An acoustic barrier is necessary in the restaurant's environment due to high noise levels within the restaurant and its surroundings. Using the green wall as an acoustic barrier, rather than standard panels, is a way of forward thinking. Reducing energy costs is another major benefit of the green wall. The plants living on the wall preform a process known as, evapotranspiration, to take in air and release it cooler than before. Green walls can earn projects LEED credits and overall, provide a space with sustainable features.

College of Arts and Sciences

Poster # 46

Validating Geospatial Analysis with Community Risk Perception Survey in Big Island, Hawaii

Darcy A Ayers
Student's Department: Anthropology Faculty Mentor: Swamy, Raja

Military vehicle-generated particulate matter released into the atmosphere are possible concerns for human health. The author's prior geospatial research has been to identify, using GIS analysis, the local populations surrounding a military installation in Hawaii that are most at-risk from the vehicle-generated particulate matter. A continuation of the past research, this project aims to assess the perceived impact of the identified dust pollution among local residents by conducting a survey through both qualitative and quantitative methods. The survey of health and public perception is then used to validate the model developed in the previous GIS analysis. This research is a contribution to the ongoing pursuit of achieving solutions to social problems through geospatial applications. Socially just environmental sustainability can begin with an identification of a problem, but must be pursued by community awareness and education. This project uses geospatial statistical analysis as a means to progress from an identified and quantified environmental problem to an assessment of the societal perception of its impact, which in turn presents an opportunity in which a community can arrive at a cooperative, sustainable solution to their environmental concerns.

Poster # 327

Discontinuous Galerkin Methods in Context of Astrophysics Simulations with Nuclear Equation of State

Brandon Lynn Barker
Student's Department: Physics and Astronomy Faculty Mentor: Endeve, Eirik

A problem of high importance in computational astrophysics is obtaining accurate solutions to the Euler equations of hydrodynamics. We are interested in solving the Euler equations in the context of core collapse supernovae. As many of the critical processes of core collapse supernovae are hydrodynamical in nature, it is imperative

that these equations be solved as accurately as possible in order to yield reliable results. Most current solutions to the Euler equations employ nite volume methods. These methods involve breaking up the computational domain into grid cells and computing a cell average of the solution over each cell. One of the drawbacks of nite volume methods is that higher order methods require larger computational stencils. We explore the use of Discontinuous Galerkin (DG) methods in solving the Euler equations in context of core collapse supernovae. In particular, we are interested in using DG methods to solve the Euler equations using a nuclear equation of state (EoS). DG methods have the advantage that higher order schemes do not require larger stencils. We aim to construct methods that preserve positivity of pressure, and baryon and electron densities. We present our solution method and results from solving Riemann problems with a non ideal EoS.

Poster # 47

Anxiety and Cognition

Jama Bettis
Student's Department: Psychology Faculty Mentor: Bolden, Jenn

Anxiety disorders are the most common mental disorder experienced by Americans, affecting 40 million adults in the U.S. and nearly 30% of Americans during their lifetime (Kessler et al., 2005). Anxiety itself, however, is neither inherently negative nor dysfunctional. In fact, anxiety is fundamentally adaptive, serving a functional role in healthy individuals by engaging both cognitive and physiological systems to prepare for action (Barlow, 2002; Langner & Eickhoff, 2013). Research has shown that anxiety has a significant, complex impact on cognition. Accordingly, individuals with high trait anxiety seem to differ from their low trait anxiety counterparts in several distinct ways. Although simple tasks tend to be performed equally well by both high and low trait anxiety participants, performance on complex and additional or secondary tasks, especially those requiring divided attention, appear to be reduced by high trait anxiety (Eysenck, 1992; Wood, Matthews, & Dalgleish, 2001;). Additional demands on cognition, through either dual-task or emotion induction, may induce anxiety-related working memory impairment specifically (Vytal et al., 2016). The current study examines the relationship between trait anxiety and cognitive performance following negative mood induction in a non-clinical undergraduate sample. Understanding the specific cognitive deficits associated with trait anxiety,

particularly following negative emotional stimuli, is vital in finding effective treatments to reduce these cognitive performance deficits. These results are particularly pertinent to college students given that approximately 23% reported anxiety negatively affecting their functioning within the last 12 months (American College Health Association, 2014).

Poster # 266

Characterization of Growth Rate of Closely Related Escherichia Coli Strains

Evalynn Chassity Borrego

Student's Department: Physics and Astronomy Faculty Mentor: Mannik, Jaan

Growth rate of closely related bacterial strains depends sensitively not only on their growth conditions but also on their genetic make-up. To investigate the effect of small genetic variations on different E. coli K12 sub strains, the growth rate of two strains, MG1655 and BW25113, was measured and compared in different growth conditions. The genetic differences between these two sub strains are well documented. The growth rate was obtained through measurements of the optical density (OD) of a cell culture using a spectrophotometer. The OD was assumed to be proportional to the number of cells in the culture and the growth rate was determined from the linear portion of the cells log(OD) vs time curve. Cells were grown in 12 ml plastic tubes with 250 rpm shaking, while the temperature and composition of growth medium was varied. The data collected indicated that an increased temperature and/or a glucose medium sped up growth, while a decreased temperature and/or a glycerin medium slowed down growth. MG1655 had an average doubling time of 148 ± 8 and 102± 8 mins at 28°C and 37°C in glucose, and 280 ± 35 and 106 ± 13 mins at 28°C and 37°C in glycerol. BW25113 had an average doubling time of 151 ± 8 and 76 mins at 28°C and 37°C in glucose, and 223 ± 23 and 103 mins at 28°C and 37°C in glycerol. In conclusion, our measurements show that BW25113 despite harboring additional genetic deletions grow faster than its parental strain MG1655 in minimal medium. One needs to be aware of these differences when comparing published results from these two sub strains.

Poster # 309

STRESS AND SOCIAL DOMINANCE: CELLULAR MECHANISMS IN THE VENTRAL HIPPOCAMPUS

Kimberly Summer Bress

Student's Department: College Scholars Honors Faculty Mentor: Cooper, Matthew

While the hormonal stress response is a normal and adaptive reaction to threatening stimuli, chronic or severe stressors can lead to a variety of negative neurophysiological and behavioral consequences. After exposure to social defeat stress, male Syrian hamsters exhibit increased submissive behavior and decreased territorial aggression in novel social encounters. This defeat-induced behavioral response is called conditioned defeat (CD). Importantly, hamsters display individual variation in susceptibility to the acquisition of the CD response. We have shown that animals of dominant social status display increased defeat-induced c-Fos expression in the ventral medial prefrontal cortex and a reduced CD response compared to subordinates and controls. While these findings suggest that dominant hamsters exhibit increased neural activity in brain regions that support coping with stress, it is unknown whether dominance status modulates neural activity in brain regions that support stress-related behavior, such as the ventral hippocampus (vHC). In this study, male Syrian hamsters were paired in daily dyadic encounters for 14 days, during which they formed stable dominance relationships. Twenty-four hours after the fourteenth encounter, the animals were exposed to acute social defeat stress consisting of 3, 5 minute aggressive encounters with a larger, trained aggressor. Immunohistochemistry for the protein c-Fos, an indirect marker of neuronal activity, was performed following social defeat stress to quantify the number of c-Fos immunopositive cells in the vHC of dominant, subordinate, and control animals. We found that exposure to acute social defeat stress was associated with increased neural activity in the vHC. Additionally, social status controls showed significantly more c-Fos labelled cells in the vHC compared to dominants, subordinates, and handled controls. Dominant hamsters did not differ from subordinates in stress-induced c-Fos expression. These results suggest that repeated aggressive encounters reduce stress-induced c-Fos expression in the vHC, regardless of whether animals win or lose. Because dominant hamsters did not differ from subordinates in stress-induced vHC activity, the vHC may not be a key brain region controlling status-dependent changes in CD vulnerability.

Poster # 310

Effects of Language Immersion vs. Classroom Exposure on Advanced French Learners: An ERP Study

Alexandra Claire Brito

Student's Department: College Scholars Honors Faculty Mentor: Bowden, Harriet

University students often report significant gains in their second language (L2) ability after spending time abroad, immersed in a language. However, evidence for the role of language immersion in achieving advanced proficiency remains largely anecdotal, especially for language processing and neurocognition. By using empirical neurolinguistic techniques, we quantify the degree to which language immersion influences native-like processing of L2. Participants are advanced French learners who self-evaluate their language proficiency and undergo two French language evaluations. Participants are separated into groups based on their degree of immersion, ranging from highly immersive learning to primarily classroom instruction. They then read French sentences, presented one word at a time, that are either correct or contain a subject-verb agreement error. In French, the error can be either silent (unpronounced) or phonologically-realized (differ in spelling and pronunciation). Using electroencephalography (EEG), we monitor the brain's electrical activity during sentence-reading. The subsequent event-related potentials (ERPs) provide insight into how syntax is processed. By comparing ERPs between groups and to those of previously characterized native speakers, we examine any differences in L2 processing. We predict that phonologically-realized errors elicit more robust ERP signatures as compared to silent errors. Secondly, we anticipate variable L2 processing, with immersion participants exhibiting more native-like ERPs.

Poster # 267

Family and Genetic History for ER+ Breast Cancer Patients: A Replication in Appalachia

Alexandra Ruth Buccelli

Student's Department: Psychology Faculty Mentor: Roberson, Patricia

Many studies and doctors acknowledge the link of having a close family member with breast cancer to be a risk factor to later developing the disease. In fact, the development of breast cancer was found to be 1.9–3.9 times higher in women with an affected mother or sister (Molino etc, 2004). However, with Estrogen (ER) positive breast cancer, many studies have contradictory results when analyzing familial history. Molino et al. (2004) found that the women with a positive familial history (limited to first and second degree relatives) were more likely to have ER positive tumors within the study. Other studies, such as Jiang etc. (2012) found that Hispanic women with a positive family history were more likely to have ER negative tumors. Tse etc. found the correlation with diagnosis to be higher between those with a mother with ER positive tumor than a sister with the same disease.

In the present study, we will examine the collection of family history records from the participants, all of whom are ER positive. We seek to understand the role of family support in the link between family history and ER positive breast cancer. The family history information collected thus far seems to support studies that correlate family history with breast cancer, with a majority of patients having a record of breast cancer within their family. Examining differences between first and second degree relatives and diagnosis of ER positive breast cancer would help develop some clarity on the discrepancies between studies results earlier. In the present study we predict that patients with first-degree and second-degree relatives will be more abundant in the data than those without a family history or with family relations beyond first and second degree.

Poster # 328

Using Discontinuous Galerkin Methods to Solve the Euler Equations in Curvilinear Coordinates

Jesse Lee Buffaloe

Student's Department: Physics and Astronomy Faculty Mentor: Endeve, Eirik

The simulation of the core collapse supernova (CCSN) problem requires a hydrody-namics solver that can adequately handle both shocks and smooth ows. Discontinuous Galerkin (DG) methods construct solutions that are linear combinations of basis functions (e.g. polynomials) on intervals of the computational domain and are well-suited to handle problems with both shocks and smooth ows. Thus, a DG hydrodynamics solver may provide an improvement over current hydrodynamics solvers used within CCSN simulations. Our work extends the work of Zhang and Shu (2011;

JCP, 230, 1238-1248) and consists of the development of a high-order DG solver for the Euler equations in generalized curvilinear coordinates. We provide a brief introduction to the CCSN problem, followed by an overview of DG methods and our use of them in solving the Euler equations in curvilinear coordinates. We also discuss the problem of ensuring positivity for non-negative physical quantities. Results from a suite of 1D test problems are presented, along with a consideration of the suitability of DG methods for these problems.

Poster # 268

Investigating the Role of SB-224289 On Yeast Membrane Dynamics

Robert Ethan Burks

Student's Department: Biology Faculty Mentor: Reynolds, Todd

Candida albicans is an opportunistic fungal pathogen that typically resides in the human gut. In immunocompromised patients, C. albicans can cause severe and even fatal infections. In addition, there are only three effective anti-fungal drugs with which to treat these infections. Thus, the discovery and development of new anti-fungal drugs is of utmost importance. Previous work in our lab included a high-throughput drug screen to identify possible antifungals. From this screen, the compound SB-224289 was identified as a potential antifungal. Further studies showed that SB-2224289 did not function as originally hypothesized. However, we found that SB-224289 caused disruption of localization of molecules at the cell membrane in Saccharomyces cerevisiae, a model yeast. Microscopy studies using fluorescent probes showed a mislocalization of both membrane-associated phospholipids (phosphatidylserine and phosphotidyl-4,5-bisphosphate) and the ATPase Pma1p. The current aim of this work is to determine the exact mechanism whereby SB-224289 produces this phenotype. Current projects include western blots to assess degredation of Pma1p in SB-224289-treated cells. In addition, we are conducting a screen of an S. cerevisiae mutant library in order to identify potential targets of SB-224289. A compound that induces endocytosis, like SB-224289, could prove useful in a wide variety of research.

Poster # 35

The U.S. Constitution as a Military Document: How can "Power to the Many" lead to Instability? 1776-1789

Austin Alan Burnett

Student's Department: History Faculty Mentor: Magra, Christopher

My history thesis concerns the United States Constitution as a military document, which improved on the Articles of Confederation that allocates too much power into the separated states. The government under the Articles was not able to ensure the safety of the United States from both internal conflicts and external actors. The states were given too much power to regulate commerce that created strife between loan holders and debtors. Since one of the main tenants of the Revolutionary war was taxation without representation, the states were too ready to side with the debtors than loan holders. This hurts the credibility of the new nation on the world stage while also building resentment between the two groups that lead to events like Shay's Rebellion. After the war against Great Britain ended the United States gained not only its independence but the Northwestern Territory that is present day Ohio, Indiana, Illinois, Michigan, and Wisconsin. Under the Articles of Confederation, while it did create a path for these territories to become states, it was not powerful enough to keep the areas fully protected. British fur traders and frontiersmen continued to occupy the area even after the war was over, even creating antagonism between Americans and the Native Tribes. The British in Canada were not able to fully support the Native Tribes, but spread the word of them creating a buffer state between the two nations during the Northwest Indian war that was being waged during this time. With the creation of the Constitution it was able to unify the United States under a stronger federal government that was able to keep the peace between its citizenry and project power in order to protect its borders from the surrounding European nations.

Poster # 311

Effects of Social Status on Responses to Social Defeat Stress in Female Syrian Hamsters

Ashley Victoria Campbell
Student's Department: Psychology Faculty Mentor: Cooper, Matthew

Understanding the neurocircuitry and neuroendocrine responses that impart stress resilience is an early step toward developing more effective treatment options for patients who suffer from stress-induced psychopathologies. Social defeat models have been used to investigate the cellular mechanisms of stress vulnerability in male rodents, although limited research has been conducted in females. We have previously shown that male Syrian hamsters exhibit elevated social avoidance following acute social defeat stress. Interestingly, male hamsters with dominant social status exhibit elevated plasma testosterone and less defeat-induced social avoidance in comparison to subordinates and controls. The objective of this study was to investigate whether dominant female hamsters display resistance to social defeat stress similar to their male counterparts. Adult female hamsters were matched based on their estrous cycle and paired in 12 daily social encounters to establish dominance relationships. Blood was collected via retro-orbital eyebleed prior to their first dominance interaction, 15 min after their first dominance interaction, and 15 min after their twelfth dominance interaction. Animals were then subjected to 3, 5-min aggressive encounters with 3 separate resident aggressors, resulting in an acute social defeat experience. Twenty-four hours after social defeat stress, animals were placed in a neutral arena with an unfamiliar, restrained animal. Their approach and avoidance behavior toward this stimulus animal was then measured and quantified. While acute social defeat increased social avoidance in the social interaction test, social status did not differentially alter social avoidance or plasma concentrations of testosterone and progesterone. Collectively, these results indicate that the neuroendocrine mechanisms that regulate individual differences in stress-related behavior in male hamsters do not necessarily apply to females.

Poster # 36

Did UT's college girls participate in the Rampant Culture of Prostitution in Knoxville in the 1950s? A Look at the Economic and Social causes of "Pickup Dating" among College Girls.

Tiffany Nichole Cantrell
Student's Department: History Faculty Mentor: Sacco, Lynn

In 1952, Look magazine identified Knoxville as having one of the highest prostitution rates in the nation. I will be examining pickup dating and B-Girls as being part of the culture of prostitution that existed in Knoxville and whether or not UT's coeds in the 1950s would have taken part in this due to economic necessity. Pickup dating started in the early 20th century among working class men and women. The men would pick a woman up, pay one of her bills, and then the woman had the option of "treating" the man with a sexual favor. It was not considered prostitution because the man never gave the woman money directly. The term pickup dating was still being used in the 1950s, but it is, so far, unclear if the paying for a bill aspect was still a part of it. B-Girls were young women in bars in the 1950s who would solicit drinks from men by performing sexual favors or showing the men their breasts. My research so far has indicated that girls who participated in pickup dating and B-Girls did not see themselves as prostitutes, but it cannot be denied that both had prostitution like aspects. My work will focus in on Knoxville, but I will also be looking nationally to draw comparisons and to put what was happening in Knoxville into context.

Poster # 48

Indigenous Rhetorics in Quebec's Education System

Pete Michael Cates
Student's Department: English Faculty Mentor: King, Lisa

Native and non-Native relationships have a tense history in Canada, from colonialization and abusive residential schools to contemporary political conversations about First Nations rights. Though the relationship has developed, there are still rhetorical nuances and consequences that preclude complete reconciliation. As a result, policy makers, educators, and researchers carry the responsibility to listen to Indigenous voices in order to reshape educational narratives to give appropriate recognition to Indigenous histories and cultures to increase accessibility and visibility not only for Indigenous students but also for non-Native students who will benefit from exposure to more diverse content and teaching practices.

My research explores the consequences resulting from current policy as they pertain to the curriculum and teaching methodologies for Quebec's education system as seen through the perspective of Native education. In order to gain insight, I have conducted interviews with Native and non-Native educators in the Western Quebec School Board who are working to implement indigenous pedagogies into their curriculum in the public system. I also interviewed Native educators at the Kitigan Zibi Kikinamadinan School on the Kitigan Zibi Reserve about their experiences working within an Anishnabe community system. The resulting project synthesizes each educator's experiences and attempts to clarify the causes and the results of the prescribed euro-dominant narratives within public and private classrooms; such a rhetorical analysis can help to think through alternatives to the current education practices for the sake of including Indigenous epistemology. The study seeks to

- examine the current rhetorical state of education methodologies for indigenous educators;
- provide a variety of perspectives on teachers' experiences teaching Native and non-Native students;
- acknowledge the strengths and weaknesses of the Canadian education system as it incorporates policy and curriculum that includes Native voices.

This study finds its significance in its continued study of these issues concerning Indigenous self- representation, public policy, and cross-cultural dialogue.

Poster # 269

The presence of various spinal joint diseases and its correlations to age and sex

Esther Heewon Choo

Student's Department: Anthropology Faculty Mentor: Steadman, Dawnie

Degenerative or rheumatic joint diseases are some of the most common conditions present in skeletons in modern human populations. In general, the changes of skeletal remains due to joint diseases, or any forms of disease and/or injury that affect joints, can be scored from observations of various joint areas, such as the vertebrae, shoulder, elbow, knee joints. This research project focuses on the investigation of the vertebrae of skeletal remains in the William M. Bass Collection to determine the presence (or absence) of vertebrae diseases. Joint diseases in the spine were studied to determine the types of diseases present based on the presence or absence of specific traits. Then, for the positive cases with joint diseases, the diseases were scored based on an ordinal scoring system modified from previous research. Moreover, sex and age estimations are important components when developing the biological profile of skeletal remains in forensic anthropology. Results of joint disease observations were cataloged based on age and sex. Both pathological conditions and spinal fractures/injuries could be significant features that are used for forensic identification purposes. Thus recording patterns of changes in the spine, especially in relation to age and sex, could determine whether or not the observations can be used in future forensic identification studies or other research purposes.

Poster # 270

Exploration of Streptomyces activity with bacteria and fungi

James Postell Clark

Student's Department: Biology Faculty Mentor: Reynolds, Todd

It has been known for quite some time that Streptomyces bacteria are capable of producing an impressive range of different metabolites that have antibiotic, antifungal, and antiparasitic properties. In this study, we examine the interactions of different Streptomyces bacteria with Candida and Pseudomonas species to better understand how Streptomyces will react when exposed to different microbes. In addition, we also attempt to generate an antibiotic profile of different bacterial strains and test whether or not any of the Streptomyces bacteria produce any specialized metabolites that inhibit or alter the growth of surrounding microbes. Out of ten different Streptomyces bacteria, one exhibited specific inhibitory effects on Candida strains while Pseudomonas strains were unaffected. Out of the remaining nine strains, one was found to have inhibitory effects on all surrounding strains, including a nourseothricin resistant Candida strain. The other strains all exhibited variable results throughout the experiment in terms of inhibiting bacteria and fungi, but for many of the strains, more profound inhibition was seen as more days passed which may be attributed to the metabolites having more time to spread across the growth medium. This work highlights that the

activity of Streptomyces is complex and can be highly variable depending on growth medium and exposure to different species.

Poster # 37

The Perception of Unmarked Appalachian English

Beth Anne Clayton

Student's Department: Interdisciplinary Programs Faculty Mentor: Grieser, Jessica

Appalachian English is not a dialect that has overt prestige due to the historical poverty in Southern Appalachia (Luhman 1990). The judgement of a dialect comes from prejudice against the speakers and not the dialectal features (Hazen and Fluharty 2004). My study aims to understand the perception of the grammar of Appalachian English when its phonetic features are absent among Southerners, non-Southerners, and non-Americans. The data is collected from an online survey of 29 participants. The survey asked participants to read three paragraphs rewritten three ways: one paragraph using unmarked Appalachian grammar, one using marked Appalachian grammar, and the original paragraph. The participants were then asked to a series of questions on what they might infer about the author of each paragraph.

The data found in this study indicates that Southerners tend to be more critical of the features found in Appalachian than any other group. Non-Southerners tend to describe the grammatical differences Paragraph 1 as colloquial rather than uneducated. Non-Americans also perceived the speaker in Paragraph 2 as uneducated however did not identify it as stereotypical speech. This study suggests that the stigma against the Appalachian dialect is strongest among Southerners.

Poster # 312

Neuroanatomical Differences Between Boys and Girls with Attention-Deficit/Hyperactivity Disorder: A Critical Review and Implications for Treatment

Shelby Taylor Clouthier, Jessica Lynn Anderson

Student's Department: Psychology Faculty Mentor: Bolden, Jenn

Attention-deficit/hyperactivity disorder (ADHD) is a childhood neurodevelopmental disorder characterized by developmentally inappropriate levels of inattention, hyperactivity, and impulsivity (Diagnostic and Statistical Manual of Mental Disorders; 5th ed., American Psychiatric Association, 2013). About 5% of school age children are diagnosed with this disorder and about 65% will have symptoms that persist beyond adolescence (Friedman and Rapport, 2015). Although girls with ADHD exhibit different symptoms relative to boys with ADHD, there is a lack of research on sex-differences in ADHD-related neuroanatomical structures. There is evidence, however, that girls with ADHD have a 10% decrease in total cerebral gray matter volume compared to boys with ADHD, although they peak 3.5 years earlier than boys (Mahone and Wodka, 2008). Given that teacher's rate boys as having higher ADHD symptomology compared to girls (Gaub and Carlson, 1997), it is necessary to inform educators on peak maturational age differences to ensure successful referrals. This review focuses on neuroanatomical differences between boys and girls with ADHD and summarizes results from 50 articles between 1999-2017. Deficits in neuroanatomical structures and levels of functioning are identified. Implications for future research and treatment options will be discussed.

Poster # 38

Lasting Impressions: Distributional Analyses of Features and Artifacts from the Topper Site (38AL23)

Cayla Briann Colclasure

Student's Department: Anthropology Faculty Mentor: Anderson, David

During the summers of 2015 and 2016, University of Tennessee, Knoxville field schools excavations on the hillside at the Topper Site (38AL23), in Allendale, South Carolina. This work represents a shifting focus away from the Paleoindian period toward the dense Mississippian and Woodland assemblages present at the site. Maps constructed utilizing QGIS document the distribution of artifacts and the arrangement of identified features in the two excavation blocks and dispersed 1x1 m units. Evidence for habitation includes hearth features as well as linear and semicircular arrangements of postholes. The distributional analysis examines utilization of space within and without the structure and determines activity areas. These distributions were compared to similar datasets from other locations, including the Woodland occupation at the G.S. Lewis West site, located approximately 30 km north along the Savannah River. Site function and broader relationships to contemporary, local communities are considered. We discuss what aspects of daily

life and household dynamics are reflected in our findings. This paper provides insights into intrasite activity patterning at Topper, local settlement variation in the Savannah River Valley, and contributes to our knowledge of the Woodland period on the Southeastern Atlantic Slope.

Poster # 291

Comparison of Field Sampled Trends of US Dryland NPP to Spatially Extensive Satellite Data

Jenna Rae Davis

Student's Department: Geography Faculty Mentor: Washington-Allen, Robert

Global satellite records of net primary productivity including the US show a trend of increase in rate of carbon gain (NPP) in drylands from 1982 to 2012. This "greening" is hypothesized to be due to woody encroachment. This is supported by a decline in land surface temperature (LST) from 2000 to 2012 in US drylands. Increased woody encroachment would be expected to increase evapotranspiration leading to decreased LST. However, the geography of aboveground net primary productivity (ANPP) appears contradictory to a field sampling study, where regions with less than 336mm of annual precipitation show decreased ANPP and regions ≥336mm of annual precipitation are increasing in ANPP. In this study, we use a time series of spatially extensive dryland NPP maps from 2000-2015 derived from Moderate Resolution Imaging Spectroradiometer (MODIS) satellite remote sensing imagery and aridity index and precipitation data to test this hypothesis that NPP in US drylands decreases from historical values in areas with <336mm of annual precipitation under woody encroachment and that that NPP increases from historical values in areas with 336mm or more. Consistent with past findings, we found that overall NPP had an increasing trend. However, contrary to the hypothesis, we found that there has been a slight increase in NPP in the semiarid/arid zone but the sub humid zone was consistent with the hypothesis.

Poster # 271

Intracellular Transport: The Role of Class XI Myosins in Organelle Movement and Root Hair Growth in Arabidopsis thaliana

Madeline M Davis

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Nebenfuehr, Andreas

Myosin XI, a plant-specific class in the myosin motor superfamily, transports organelles and vesicles along actin filaments. This transport drives cell growth and cytoplasmic streaming, which is the mixing of cellular contents. Root hairs, outgrowths of single epidermal cells, exhibit polarized cell growth and are thus highly dependent on active transport to the tip. Myosin XI mutants mya2 and xik exhibit reduced root hair length, with xik being more affected. Mutants in xib display normal root hairs, but additional loss of the closely related MYA2 gene in mya2 xib double mutants results in extremely short root hairs. This indicates functional redundancy between MYA2 and XIB. We hypothesize that shorter root hair length results from reduced cargo transport, where XIK transports different cargo from MYA2 and XIB, which transport the same cargo.

Using fluorescence microscopy and image analysis, we found that among single mutants, peroxisomes moved slowest in xik, somewhat faster in mya2, and similar to wild type in xib. mya2 xik exhibited peroxisome speeds similar to xik, while peroxisome speeds in mya2 xib were similar to mya2. These findings indicate that XIK plays a dominant role in peroxisome transport.

Poster # 39

The History of Mayan Resilience as Seen in the Indigenous Language, Particularly K'iche'

Savannah Dixon, Simone A Yates, Kelsey E Waterson

Student's Department: Modern Foreign Lang/Literature Faculty Mentor: Gimmel, Millie

In the Western Highlands of Guatemala, the Quiche' people sustain their culture in dress, food, and language. The k'iche' language is spoken by over one million people in Guatemala making it the largest indigenous group and spoken language of the twenty-three indigenous populations. The Mayan people make up the largest indigenous people group in the Americas with roughly six million people identifying as one of the twenty-three Mayan groups. Today, five million Mayans reside in Guatemala, and one of those millions is the nation of Quiche'.

The Quiche' nation was made famous in the 1980's by the story of Rigoberta Menchú –a Nobel Peace Prize winner and indigenous land rights activist. Her story of the treatment of indigenous peoples during the thirty-six year Guatemalan Civil War brought the Mayan people into the limelight of indigenous American preservation. Her testimonial along with other cultural artifacts in film – Hombres Armados, El Norte, and Ixcanul – and novel – Balam Canaan and Chilam Balam – work together to create a picture of indigenous expression. Juxtaposed in Spanish and indigenous languages, the story of indigenous resilience shifts slightly, but through these cultural artifacts, the indigenous voice – in both the mother and colonial tongue – and language sustains the tradition, history, and expression of the Mayan people.

Poster # 61

Project or Presentation Title: Rural Kenyans' views on healthcare, nutrition, and foreign medical providers

Charles Earles

Student's Department: College Scholars Honors Faculty Mentor: Baldwin, Debora

Introduction: While extensive research has been done on the role of trust in western medicine, its role is largely unknown in rural areas of sub-Saharan Africa. This study examined the construct of trust in regard to medical providers and factors influencing this trust among rural Kenyans. Methods: Participants were 139 adults (53 % females and 47 % males) who resided in the village of Tawa. They were asked to complete a 23-item survey which measured levels of trust in medical providers as a function of age, gender, education, and nationality. Results: In terms of overall trust levels, younger adults (18-35) and less educated individuals (high school or less) were less trusting ($p < .05$) of medical providers compared to their counterparts. Respondents were more likely to trust medical providers who spoke their language ($p < .01$). However, the gender ($p = .39$) or nationality ($p = .80$) of the medical provider was not a factor. Moreover, there were no group differences on the importance of receiving healthcare. Conclusion: Collectively, the results suggest that while trust may vary, Kenyans are very interested in receiving healthcare. These findings will provide additional information for healthcare providers serving in sub-Saharan Africa.

Poster # 272

Susceptibility of A. thaliana with varying TGG1 expression to H. schachtii nematode infection

Mark R Edens

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Burch-Smith, Tessa

In plants, several signaling and metabolic pathways synthesize molecules for plant defense. Myrosinases are important enzymes that degrade certain amino acid-derived metabolites, called glucosinolates, into plant defense chemicals in response to tissue damage from pathogens and herbivores. The myrosinase of interest in this experiment is encoded by the THIOGLUCOSIDE GLUCOHYDROLASE1 (TGG1) gene in Arabidopsis thaliana. TGG1 is responsible for most myrosinase activity in above-ground structures of A. thaliana. We investigated the role of glucosinolates on altering the ability of parasitic nematode to infect Arabidopsis plant. A susceptibility assay was performed to test the varying myrosinase levels. We hypothesized that changes in TGG1 expression would alter the outcome of nematode infection by changing the level of production of glucosinolate-derived defense compounds. The experiment involved two A. thaliana tgg1 mutants and three independent transgenic A. thaliana lines overexpressing TGG1. A. thaliana seedlings were inoculated with second-stage juveniles of Heterodera schachtii (beet cyst nematodes), and the number of adult female nematodes on the plant after 21 days was scored. We found that plants with altered TGG1 expression have changes in susceptibility to cyst nematode infection.

Poster # 292

Evidence for the priming effect in single strains and simplified communities of estuarine bacteria

Abigail Amina Edwards

Student's Department: Microbiology Faculty Mentor: Buchan, Alison

Through their transformation of naturally occurring organic matter, coastal marine bacteria play an essential role in carbon cycling. A phenomenon termed the priming effect (PE) occurs when microbial communities remineralize recalcitrant organic matter faster in the presence of labile organic matter and may be prevalent in coastal systems. To understand how microbial community members interact to induce PE, it is essential to first understand the mechanisms underlying PE in single strains and simplified bacterial communities. The effect to which different concentrations and

sources of labile carbon stimulated the production of bacterial biomass from riverine organic matter by two marine bacteria Sagittula stellata E-37 and Citreicella sp. SE45, and a six-member, artificial community of marine bacteria that included these two strains was examined. Both strains were primed with 400µM-C acetate and 400µM-C casamino acids; however E-37 was primed with 40µM-C casamino acids, while SE45 was primed with 400µM-C tryptone. The community was primed by 400µM-C tryptone and 400µM-C coumarate. These data indicate that the magnitude and nature of PE is species-specific within the estuarine microbial community. Learning how community members contribute to a PE response will lead to a more holistic and mechanistic understanding of PE and, thereby, carbon cycling.

Poster # 273

Virus-Induced Gene Silencing of TAT1 in Nicotiana benthamiana

Nekiaya L Elam

Student's Department: Biology Faculty Mentor: Burch-Smith, Tessa

In plants, plasmodesmata serves as the plasma membrane-lined pores that permit intercellular communication. Cells need to communicate for survival. Therefore, plasmodesmata makes this possible by allowing trafficking of water and nutrients. Active transportation is also a component of plasmodesmata, which includes the movement of plant viruses between the cells. TAT1 encodes cytosolic tyrosine aminotransferase, which strongly stimulates aging and chlorosis. TAT1 is involved with biosynthetic processes and localizes to the cytoplasm. We were interested in examining TAT1 functions in Nicotiana benthamiana. For this we used Virus- Induced Gene Silencing (VIGS). VIGS exploits plants' antiviral defense mechanism mediated by RNAinterference (RNAi) for the downregulation of gene expression. VIGS helps characterize the gene functions of a plant and results in rapid phenotype. Viral vectors carry inserts from the host gene they are targeting for silencing. Tobacco rattle virus (TRV) was used in our experiments. TAT1-silenced N. benthamiana plants developed severe chlorosis. Other effects of reduced TAT1 expression will be presented including effects on intercellular trafficking of fluorescent probes.

Poster # 293

Late Mississippian Community Assemblages in the Illinois and Appalachian Basins

Collin Brice Fedak, Michael Franklin Lannom, Jennifer Elizabeth Bauer

Student's Department: Earth/Planetary Sciences Faculty Mentor: Sumrall, Colin

The Glen Dean formation, which represents Upper Mississippian strata, is deposited across the entire Illinois Basin. Basin wide deposition provides a unique opportunity to examine variation across environments within a single basin. Despite intensive stratigraphic studies, it has only recently begun to be analyzed in terms of faunal distribution. Our lab group has been analyzing the fauna of Western Kentucky in the Illinois Basin. In order to get a complete understanding of the environments across the basin we aim to to examine an adjacent basin at the same time interval to use as a baseline for comparison and subsequent analyses.

Strata of the Appalachian Basin are exposed at Big Hill, Kentucky representing a coeval unit to the Glen Dean of Western Kentucky. We combine this new data with the pre-existing dataset in order to better characterize the fauna via multivariate statistics. We will utilize Detrended Correspondence Analysis, which looks for changes in ecological datasets and does well with binary data. During this time, sediment input recently shifted to the northern Appalachians and should be affecting these basins differently. We expect that the life strategies of similar fauna may have been impacted and would be represented in species variation and diversity.

Poster # 40

The Impact of Bread Production on Women's Roles in the Book of Leviticus

Iessandra Elisabetta Ferrero

Student's Department: Religious Studies Faculty Mentor: Darby, Erin

The book of Leviticus is rich in its ritual, legal, and moral instructions. Traditionally, Leviticus is said to have been written by Moses, which would date the text to the Middle Bronze Age. The text is supposed to consist of God's speeches to Moses that he was instructed to give the Israelites. However, most scholars believe that Leviticus was not completed until after the Jews returned to Jerusalem from exile, dating it to the Persian period. If this is the case, then the instructions would reflect the practices of that time. Among the topics of importance, one finds instruction and

emphasis regarding bread and the transformation of grain to bread. Not only does it serve a ritual function, but it appears to be one of the primary sources of nutrition for the ancient Israelites. Other biblical passages and ethnographic studies imply that bread production primarily a woman's role. This presentation will explore the potential importance and impact bread production had on women's roles in Israelite public ritual through the analysis of the book of Leviticus and the language used within it. Beyond literary description and analysis, this presentation will focus on material culture remains to describe the actual presence of bread and grain in ancient Israelite cultural practice, drawing on data gathered from excavations of Jerusalem.

Poster # 313

Choline Supplementation effects on adolescent stress

Christopher James Finotti

Student's Department: Interdisciplinary Programs Faculty Mentor: Schulz, Kalynn

Developmental stress is associated with risk for adult mental illness. Choline is an essential dietary nutrient important for healthy brain development. Recently our lab has demonstrated that administering choline supplements during rodent pregnancy mitigates the negative effects of prenatal stress on memory function. However, adolescent supplementation of choline and its potential buffering effects against adolescent stress are unknown. Therefore, we tested the hypothesis that choline supplementation during adolescence will prevent the effects of stress on working memory using the T-maze test. In the T-maze, a rat is placed at the base of a "T" shaped box and allowed to explore. Once the rat has fully entered a side at the top of the T, they are sectioned off in that side for 70 seconds. After 70 seconds the rat is returned to the base of the T and the test is run again for a total of five trials per rat. Rats with intact memory function will alternate between each side of the "T". Our hypothesis predicts that stressed choline-supplemented rats show higher alternation rates than stressed standard-diet rats, similar to nonstressed controls. Since choline is safe and necessary for human consumption this may be an effective intervention for adolescents.

Poster # 49

How short term mindfulness training affects emotional regulation on college students.

Holly Flatt, Kriston Laadan Ramsey, Andrea Benavides

Student's Department: Psychology Faculty Mentor: Bolden, Jenn

Emotional regulation (ER) is the experiences and expressions of emotions which aids in the balancing of positive emotions and emotional processing (Gross, 2001; Hölzel, 2011). An important advancement in the field of psychology is greater understanding how treatments can positively influence emotion regulation. One promising intervention to improve emotion regulation is mindfulness training—the practice of being aware of one's current internal state and thoughts, and providing a greater attentiveness and acknowledgement to one's current environment (Hoffman et. al., 2010; Langer 2000). The current study examined the effect of brief mindfulness training on emotion regulation after a negative mood induction via film, as compared to students who received no emotion regulation training. A sample of undergraduate students (n=110, 57% female) were recruited to participate and subjects were excluded for pre-existing depression, cognitive impairment, and psychiatric medication usage. Participants were randomly assigned to two conditions (e.g., mindfulness vs. no training). Those in the mindfulness training were instructed to acknowledge their thoughts and let them pass by like clouds in the sky, while those in the no instruction condition were directed to wait for the next task to begin. All participants then watched two film clips designed to induce negative mood. Participants who received mindfulness training reported lower sadness and higher happiness compared to participants in the no-instruction condition. However, self-reported anxiety was relatively constant for participants in both conditions, which was measured using subjective ratings. These findings suggest that brief mindfulness training can have an immediate effect on distressing situations and can lead to improvements in emotion regulation.

Poster # 294

Detection of Isotope Bio-signatures in Antarctic Subglacial and Surface Sediments

Miranda Morgan French

Student's Department: Ecology/Evolutionary Biology Faculty Mentor: Szynkiewicz, Anna

Biological processes lead to significant kinetic isotope fractionations and negative δ13C, δ15N and δ34S values in

organic compounds compared to more positive values in C-N-S inorganic sources. Consequently, these isotope tracers can be used as biosignatures for determining the processes that characterize life forms and their metabolism. The main research question of this study is: Are there any distinctive isotope bio-signatures preserved in subglacial and surface sediments from Antarctica? The bulk C, N, and S isotope compositions were determined in subglacial and surface sediments from various locales in Antarctica including the McMurdo Dry Valleys, Andvord's Fjord along the Palmer Peninsula and from the grounding zone of the Whillans Ice Stream below ~750m of ice. Results of the isotope analysis showed two samples with N below detection and high δ13C values (10.096%, 4.58%). These samples were collected from surface brine precipitates and around the moat of Blood Falls at Taylor Glacier, McMurdo Dry Valleys. The results indicate that these samples are least likely affected by microbial processes.

Poster # 50

The Relationship Between Perceived Acceptance, Depressive Symptomology, and Commitment Among Couples

Andrea M Gorrondona

Student's Department: Psychology Faculty Mentor: Gordon, Kristina

The aim of this study was to evaluate whether the extent to which an individual perceives that his/her partner accepts him/her is related to that individual's own level of depressive symptomology. While research has established that increasing acceptance in couples therapy has been beneficial, research specifically regarding perceived acceptance is sparse. We expect this construct to be related to depression for a variety of reasons. First, decreased social support and increased hostility from one's partner have been identified as key factors that may increase the likelihood of depression. Furthermore, research has also shown that perceived criticism by one's partner is related to an increase in depression. Because acceptance is the acknowledgement of a partner's flaws in an open and receptive manner, perceived acceptance is likely related to increased perceived social support and decreased perceived criticism and hostility. Lastly, when viewed from an attachment perspective, acceptance is likely important as it allows an individual to feel secure and loved, so in its absence negative emotional consequences are expected. Furthermore, commitment, while usually regarded as a positive construct, may moderate this relationship, such that when commitment is high, there were will be a stronger negative relationship between perceived acceptance and depression.

Poster # 274

Identification of Streptomyces isolate-specific secondary metabolites capable of influencing Arabidopsis thaliana root microbiome establishment

David Leighty Grant

Student's Department: Biology Faculty Mentor: Lebeis, Sarah

Recent studies of the microbiome of Arabidopsis thaliana have shown that members of the family Streptomycetacea are enriched within the root (endophytic compartment (EC)). Four novel Streptomyces isolates within this family were selected for study due to their ability to differentially influence the plant root phenotype, including root morphology and colonization. Phenotypic variation between members of the community and the associated plant suggest that metabolites made by the different isolates may influence plant phenotype. The genomes for each strain were then analyzed for potential secondary metabolites. Genome and biosynthetic gene cluster identification have revealed that the two most competitive colonizers have melanin biosynthesis pathways. We are now investigating the role of melanin in colonization. First, melanin extraction was performed to further understand the structure and function in both competitive colonizers. It was also discovered that one of these two Streptomyces strains possesses a phenazine biosynthetic pathway, indicating possible antimicrobial activity. The phenazine was extracted and competitive assays were performed to determine the antimicrobial activity of the compound. Based on these findings, we hypothesize that isolate-specific secondary metabolites, specifically melanin and phenazine, influence colonization competitiveness and capability. Taking both metabolites into consideration, it is suspected that Streptomyces species are major drivers in the composition of the EC microbial communities as well as plant host phenotypes. We expect the metabolic profiles of these competitive colonizing Streptomyces species to give a greater understanding of plant associated microbial communities.

Poster # 51

Temperament's Effect on Interactional Synchrony

Leanza Greenlee

Student's Department: Psychology Faculty Mentor: Shteynberg, Garriy

The phenomenon of interactional synchrony has been studied by psychologists for several decades. Interactional synchrony involves the coordination and synchronization between people in a social interaction. There are different kinds of synchrony that can be measured, including synchrony of biological rhythms (McGrath & Kelly, 1986), simultaneous behavior (Bernieri, Reznick, & Rosenthal, 1988), and perceived synchrony (Condon & Ogston, 1967). McDowall (1978) has also proposed that a potentially effective, and possibly more accurate, measurement of interactional synchrony would be the rate of movement over the span of an interaction. Though the phenomenon of interactional synchrony has been measured and tested by many researchers, is it still not known exactly what causes some people to synchronize better than others. My research is particularly interested in how temperament is related to higher or lower rates of movement between two people. My hypothesis is that higher scores of extraversion will correlate with higher rates of interactional synchrony (will express more similar rates of movement) than those with lower scores of extraversion. Moreover, I also predict that there will be a positive correlation between scores of effortful control and interactional synchrony. Data has been collected, and the analysis is currently under way.

Poster # 52

How Are You Feeling? An Examination of an Indirect Measure of Emotional States

Nicholas Ross Harp, Shichie Joyce Kuribayashi, Claire Rebecca Myrick, Nicholas Alvaro Coles

Student's Department: Psychology Faculty Mentor: Larsen, Jeff

Psychologists traditionally investigate emotional phenomenon by asking people to self-report their emotions directly. However, these responses can be biased by 1) individual differences in ability to reflect upon and report emotional experience, and 2) impression management. To address these concerns, researchers developed a self-report method that measures emotion in an indirect manner: the Implicit Positive and Negative Affect Test (IPANAT; Quirin, Kazel, & Kuhl, 2009). Previous research suggests that the IPANAT is influenced by both a) individual differences in trait emotionality (whether someone tends to be generally positive/negative), and b) differences in current emotional states. The purpose of this research is to explore the IPANAT as a measure of happy, sad, and bittersweet emotional states. Pilot Study: Using a within-subjects design, 159 participants watched happy and sad videos, and subsequently completed the IPANAT. Results indicated that the IPANAT successfully distinguished between the emotions elicited by the positive and negative videos. Main Study: Using a between-subjects design, 151 participants watched either a neutral, happy, sad, or bittersweet film, and subsequently completed the IPANAT. Contrary to expectations, the IPANAT failed to distinguish between the emotions elicited by the positive, negative, and bittersweet videos. Results indicate that the IPANAT may be a viable approach for indirectly assessing emotional states, but it has limited application in between-subjects designs. We believe that the measure is strongly influenced by individual differences in trait emotionality, which are not controlled for in between-subjects designs. Implications and future directions are discussed.

Poster # 314

Chemosensory Among Organisms

Blake Aaron Hodge

Student's Department: Biology Faculty Mentor: Park, Jae H

The purpose of this study was to research existing literature and highlight the biological significance of chemosensory systems among several model species while also looking at some of the physical properties of the systems and signaling molecules. Chemosensory refers to the sensing of chemicals of a different gradient, and that often elicits a response in living cells. These processes are commonly known as signal transduction, and they are vital for cells to function efficiently. This process can look different in prokaryotes, simple eukaryotes, and complex multicellular eukaryotes, but many aspects remain unchanged or similar. This indicates the evolutionary significance of the processes and highlights the importance of cells being able to differentiate the chemical environment they are in. Research was done separately on literatures concerning the model species, and then further conclusions could be drawn after all research was completed.

Poster # 275

Genetic and molecular characterization of Arabidopsis thaliana eukaryotic initiation factor (eIF)2Î±

Jeremiah Ray Holt

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Vonarnim, Albrecht G

Like DNA replication and transcription, translation (protein synthesis) is a basic requirement for life and an integral component of the Central Dogma of molecular biology. The initial phase of translation requires the action of initiation factors, which help ribosomes identify the start codon on the nascent transcript. Arabidopsis thaliana harbors two homologous copies of eukaryotic initiation factor (eIF) 2α, which are encoded by Chromosome 2 (At2g40290)- At2eif2α and Chromosome 5 (At5g05470)- At5eif2α. Till date, studies on eIF2α have been targeted towards the role of its phosphorylation under variety of stress conditions. However, the molecular function of the individual gene products and role of phosphorylation in plant growth and development remains elusive. Work presented here aims to provide new insights into the critical role of two different eIF2α homologs in A.thaliana growth and development. Heterozygous T-DNA insertion lines for At2eif2α (+/-) show normal growth and development while the homozygous At2eif2α (-/-) show sever growth related defects and are infertile. At5eif2α (-/-) seedlings exhibit slower root growth but develop normally as Wt.Col_0 and are able to retain fertility for successive generations. The difference in growth defects for At2eif2α (-/-) and At5eif2α (-/-) suggests different level of functional redundancy in translational regulation and A.thalaina overall development. To dissect this functional redundancy and growth phenotype, work is underway to complement the At2eif2α (+/-) and At5eif2α (-/-) plants with fluorescent reporter and epitope tagged constructs under respective native promoters. In addition a biochemical approach to understand the role of phosphorylation on translation efficiency is being tested using in vitro translation system with recombinant eIF2α.

Poster # 295

Ontogenetic and Systematic Study of Eucystis (Diploporita: Echinodermata)

Sarah Rebecca Johnson

Student's Department: Earth/Planetary Sciences Faculty Mentor: Sumrall, Colin

Our understanding of growth patterns, paleoecology, and systematics of the diploporitan echinoderm Eucystis, is poorly understood, leaving a number of questions concerning their evolutionary history. Eucystis has the longest temporal range (Ordovician-Devonian) among diploporitan echinoderms and one of the widest geographical ranges, with fossil collections from Laurentia, Gondwana, and Baltica. Eucystis is identifiable by comparatively long, multibrancing ambulacra that end in a varying number of brachiole facets, ovate to spherical theca, pentagonal thecal plates, and a holdfast attachment structure of varying size and shape.

Juvenile specimens are rare, and often are absent from research collections, and the preservation of most diploporitans is poor, leaving many morphologically important features taphonomically weathered or disarticulated. However, Eucystis angelini, collected from the Upper Ordovician of Sweden, is preserved in uncharacteristically high numbers and preserve a wide range of ontogenetic stages.

A morphometric study of E. angelini was performed on a large collection of specimens. Measurements of the thecal body, peristome (mouth), periproct (anus), feeding ambulacra, plates, respiratory structures, and holdfast were taken and analyzed to quantify this species' growth patterns. The study suggests that the ambulacra grew at a faster rate than the theca. A second study used the previously collected data to determine which variables are driving the overall changes in size and shape from juvenile to adult form, and which variables are driving the separation between proposed species of Eucystis. Certain variables cannot be used to determine growth patterns and delineating species; the morphology of the holdfasts are likely controlled by external environmental factors and are not related to the growth of the organism.

The results from this study will aid in better understanding diploporitan growth patterns, which can be compared with other early Paleozoic echinoderm ontogenies, and will also allow for better understanding of diploporitan paleoecology. This study highlights the importance of finding juvenile fossils, and how critical they are in assessing ontogenetic growth of echinoderms.

Poster # 41

Tolstoy, Shklovsky, and the Image of Creativity in Nabokov

Erika Rene Knowles

Student's Department: Modern Foreign Lang/Literature Faculty Mentor: Blackwell, Stephen H

Nabokov's admiration for the works of Tolstoy is well-known; his engagement with Victor Shklovsky and other Formalists has been explored in detail by Irina Paperno and Marina Kostalevsky as well as by Michael Glynn. This paper examines Tolstoy's (and Shklovsky's) strong presence in three of Nabokov's works—"Sounds," "The Circle," and Speak, Memory—that all include portraits of Tolstoy formed entirely from the words of his own writings. Each one occurring in a village schoolhouse, these portraits are emblematic of the way that Nabokov set himself before the image of his great predecessor as he undertook the task of learning to be a writer. Each of these portraits is accompanied by echoes of Tolstoyan imagistic and thematic concerns, which shed direct light on the given work by Nabokov. Nabokov turned to Shklovsky to help identify the Tolstoyan tools he might use to advance his own art. This analysis offers new insight into the manner in which Nabokov engaged the work of the 19th century master, both as a source of great inspiration and as a model to be overcome.

Poster # 315

Surface Enhanced Raman Spectroscopic Detection of Neurotrasmitters

Emily Southida Kounlavong, Taylor Dawn Payne, Katherine Nicole West, Roxanne Lillian Puleo

Student's Department: Chemistry Faculty Mentor: Sharma, Bhavya

Current in vivo methods for analyzing neurochemicals include invasive procedures, such as drilling a hole through the skull. Common in vitro methods of neurotransmitter detection through analysis of biofluids require considerable time to gather and process data. Therefore, there is a need for the development of a detection method that is non-invasive, selective, rapid, and label free. Surface enhanced Raman spectroscopy (SERS) would be advantageous for the detection of local concentrations of neurotransmitters in non-invasively collected biofluids. This method of Raman spectroscopy provides enhanced signals through the adsorption of low concentration analytes to gold nanoparticles, which creates an oscillating electric field called the localized surface plasmon resonance (LSPR). In the Sharma lab, we focus on the development of biosensors for early disease detection through the use of gold nanoparticles to achieve SERS detection of five major neurochemicals. In order to optimize enhancement, we vary the acidity of the nanoparticle solution. SERS allows for a highly selective detection method that provides rapid sample analysis. We present the development of our detection method along with results on the SERS detection of five major neurotransmitters in the micromolar to nanomolar range.

Poster # 276

Screening for Novel Anti-apoptotic Factors in Neurons of Drosophila melanogaster

Haylie Rachel Lam, Abbigail Elizabeth Stidham

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Park, Jae H

Drosophila melanogaster, the common fruit fly, is a model animal with a highly characterized genome with homologs found in the human genome. Many human genetic disorders have homologs within the fruit fly's genome. For this experiment, we used CCAP neurons, Crustacean Cardioactive Peptide producing neurons, due to its apoptotic nature after adult eclosion and crossed them with our targeted gene to produce progeny with that target gene either expressed or down regulated. Inducing premature death within these neurons via crossing the different target genes indicates possible anti-apoptotic activity of the gene that was knockdown. This is important in finding clues in surviving juvenile neuronal degradation as it gives clues to which pathway should be investigated more thoroughly. If the knockdown gene was important and the crossing was successful, it would cause premature pupal death which is a visible phenotype allowing for easy selection without any invasive testing to be done to the subjects. Comparing results against our positive control with the known apoptotic grim gene that induced complete premature programmed death, most of the tested genes from different pathways such as the JUN kinase pathway had no effect on the adults. However, some genes resulted in partial deformation of the wings which indicated some premature apoptotic effect. Future projects will be investigating these genes and their pathways to find more information regarding neuronal degradation.

Poster # 329

Using a GIS Model to Identify Outcrops Along Roadways

Michael Franklin Lannom
Student's Department: Geological Sciences Faculty Mentor: Washington-Allen, Robert

A significant issue for geologists is referencing old locality data making them difficult to resample. We developed a model where a geographic information system (GIS) is utilized to identify outcrops of interest along roads. This model, in concert with general knowledge of bedrock geology, is a beneficial tool for geologists attempting to discover localities containing data relevant to their research. The model uses a slope map generated from a digital elevation model (DEM). This map is then filtered using a map of the same study site showing areas of bare Earth proximal to roads. The slopes of the remaining points are analyzed to find the largest clusters with steep slopes. These clusters are then ground truthed using Google Earth to show if they correlate with a rock outcrop. The areas studied in this model were selected based on availability of data, knowledge of the rock units, and experience at localities within them. This study aims to test many different parameters to find a model which can be used to find outcrops with high accuracy over large areas while minimizing difficulty of use.

Poster # 308

Dead or alive: How mycorrhizae influence survivorship of plants with neighbors

Helen Law
Student's Department: Ecology and Evolutionary Biology Faculty Mentor: Henning, Jeremiah

Helianthella quinquenervis is a sunflower that dominates the montane meadows of the Western Rocky Mountains along with bunchgrass, Festuca thurberi. Previous research has suggested that Festuca significantly affects the fungal communities that are associated with Helianthella, however, this effect is contingent on distance. Root associated fungi, like arbuscular mycorrhizal fungi or dark septate endophytes, are plant mutualists that regulate plant productivity and survivorship by exchanging nutrients for carbon. However, it is unknown whether Helianthella associated with Festuca's fungal community comes with any tradeoffs in plant survival or productivity. To fill this knowledge gap, we constructed four different soil treatments which manipulated the activity of the fungal communities and legacy effects in soils that originated from different distances to Festuca in the field. This allowed us to test for possible mechanisms in how Festuca affects the soil communities of Helianthella. We hypothesized that Helianthella would have reduced biomass in soils that were pre-treated with Festuca because Festuca would create a fungal community that was less beneficial to Helianthella growth and survival. We found that Helianthella survivorship increased with original inoculum distance to Festuca. Surprisingly, Festuca had a stabilizing effect on Helianthella survival, holding it consistently at about 75%. We also found that the treatment with no Festuca and sterilized dirt tended to grow taller than other treatments, in spite of lower survivorship. Overall, our study suggests that contemporary and past neighbors can shape fungal communities within a focal plant species and these shifts in fungal communities can feedback to influence plant survival. Long-term monitoring is necessary to understand how plant-plant mycorrhizal interactions will shape long-term plant community composition and ecosystem function.

Poster # 296

Ant Biodiversity in Switchgrass Fields and Other Land Cover Types in the U.S.

Kane Alec Lawhorn
Student's Department: Biology Faculty Mentor: Kwit, Charles

In response to climate change, many nations such as the United States have begun to shift away from traditional fuels, primarily fossil fuels, and toward cleaner forms of energy, such as energy derived from biofuels. Switchgrass, Panicum virgatum, is one popular bioenergy crop, and the effects of its widespread landscape incorporation on biodiversity and ecosystem processes have been favorably viewed relative to alternatives. The effects of switchgrass monocultures on certain arthropod communities, specifically ants, are unknown. A loss in ant biodiversity could have an effect on certain ecosystem services, such as bioturbation. In this study, ant diversity is compared between monoculture fields of switchgrass and non-switchgrass land cover types that could potentially be converted to switchgrass monocultures in Pennsylvania, Tennessee, and Kansas. Insect specimens were collected using pan traps in the summers of 2014 and 2015, and all ant specimens were separated for further identification. Ants were identified to the species,

and ant abundance and diversity among the Switchgrass monocultures and the native fields were compared using community analysis metrics. Preliminary analysis of subsets of data indicate a difference in community composition between the monoculture and natural fields. Furthermore, continued conversion of other land cover types to switchgrass monoculture could result in changes in ant biodiversity and abundance.

Poster # 316

Antibody characterization in the anuran auditory system

Ann Marie Lawson, Alexa Lorren Hartman

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Hall, Jim

The inferior colliculus (IC) is the major processing center for ascending and descending auditory pathways and audiomotor integration. Its anuran (frogs & toads) analog, the torus semicircularis (TS), is of interest because amphibians represent the developmental transition from aquatic to terrestrial hearing. Anuran mating behavior is mediated by acoustic mating calls, making the bullfrog an excellent model organism. Dopamine, a prevalent neurotransmitter, functions in the reward, social behavior, and decision-making pathways, and plays a role in audition in the TS. Immunohistochemistry (IHC) was performed to elucidate the dopamine pathway's function within the auditory system using tyrosine hydroxylase (TH), dopamine 2 receptor (DRD2) and dopamine 1 receptor (DRD1) targets. In order to confirm the antibodies bind to bullfrog antigens, we will characterize the antibodies via Western blot on TS samples. Western blots are a common technique used to detect proteins present in a sample by separating them on a charged gel by molecular weight. After transferring the proteins to a testable membrane, the antibodies are applied to the protein samples ensuring they bind to their protein target at a point corresponding to the correct molecular weight. After visualization is performed, the affinity of each antibody for its target is confirmed.

Poster # 317

Circadian Rhythms in Matrix Metalloproteinase-2/9 Proteolytic Activity in the Suprachiasmatic Nucleus

Sarah Grace, Grace Lebovitz

Student's Department: Biology Faculty Mentor: Prosser, Rebecca A

The suprachiasmatic nucleus (SCN) in the hypothalamus functions as the primary circadian clock, synchronizing behavioral and physiological circadian rhythms to the 24-hour cycle of environmental light. Disease pathologies including metabolic disease, depression and cancer risk are associated with prolonged disruptions in circadian rhythms. Although circadian rhythms are generated by a transcriptional-translational feedback loop, work in our laboratory has implicated a variety of extracellular proteases in the regulation of circadian rhythms. For example, there are time dependent phase-shifting effects on the clock after inhibiting the extracellular proteases, matrix-metalloproteases-2/9 (MMP-2/9). For this study, we are investigating how endogenous MMP-2/9 activity in SCN tissue changes over time by quantifying the amount of MMP-2/9 proteolysis of several substrates (e.g., β-dystroglycan and neuroligins 1, 2, 3 and 4) at three time points across the 24-hour circadian cycle. Preliminary data from western blotting for MMP-2/9 substrates at different time points with and without MMP-2/9 inhibition treatments suggest that MMP-2/9 activity changes across the circadian cycle. Understanding the mechanisms through which MMP-2/9 modulates circadian clock phase helps us understand how phase shifts in circadian rhythms are generated. This in turn can clarify the ways in which circadian disorders occur, and how they can be treated.

Poster # 318

Does Perinatal Choline Supplementation Normalize Prenatal Stress-Induced Alterations in Basolateral Amygdala Î±7 Nicotinic Acetylcholine Receptor Levels?

Robert Paul Ledbetter

Student's Department: Psychology Faculty Mentor: Schulz, Kalynn Marie

Prenatal stress (PS) is associated with aberrant brain development and expression of adult psychiatric disorders, like anxiety and depression. Rodent PS is associated with increases in α7 nicotinic acetylcholine receptors (nAChR), potentially contributing to abnormal behavioral function. While safe stress interventions during the prenatal period are lacking, dietary choline-supplementation mitigates the negative effects of PS on anxiety-related behavior and memory function. Whether choline mitigates the stress-related behavioral effects via nAChR changes, however, is currently

unknown. This current study tests the hypothesis that choline supplementation ameliorates the effects of PS on adult behavior by normalizing α7 receptors concentrations in the basolateral amygdala (BLA) to determine if choline-supplementation can be used to combat stress-related psychopathologies. Female rats were assigned to one of 4 groups: nonstresed+control diet, PS+control diet, nonstressed+choline, PS+choline. Brain tissue was subjected to [I125] labeled α-bungarotoxin autoradiography to assess receptor concentrations. We predict that PS will cause anxiety-related behavioral effects as well as increases in α7 nAChRs in the BLA and that choline supplementation will normalize these abnormalities via nAChR alterations. Data are still being analyzed and preliminary results will be presented at the EURēCA event.

Poster # 278

Circadian clock and ROS homeostasis control GCN2 dependent phosphorylation of Arabidopsis thaliana eif2α

Madison Kathleen Leonard

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Albrecht VonArnim

Day-night (Circadian) cycles are necessary for plants to regulate their metabolism for desired growth and development. This metabolic output is dependent upon the combined action of specific gene products that are transcribed and translated in a regulated manner. Studies have shown that ☐30% the course of the day-night cycle, and are under the control of a circadian clock. However, most independently abundant proteins and enzymes cycle little in comparison. Previous studies from our lab have shown that varying classes of mRNAs are translated differently based on the day-night cycle (e.g., chloroplast protein mRNAs in the morning when photosynthesis is ongoing). Although these and related studies have provided a global view of translation regulation under the day-night cycle, the knowledge of translational control at the molecular level remains elusive. Work presented here shows a novel mechanism of translational management using eukaryotic initiation factor (eIF)2 ☐ phos that links light (Circadian clock) and Reactive Oxygen Species (ROS) signalling to protein synthesis. We show that Arabidopsis thaliana eIF2 ☐ is pl GCN2. This phosphorylation mechanism depends on the light mediated ROS production and may regulate protein synthesis by stalling translation of undesired mRNAs during the day phase, which remains to be further verified.

Poster # 319

Mapping the Identity of Perineuronal Net-Positive Neurons in the Whole Mouse Brain

Taryn Drew Lester

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Krishnan, Keerthi

Perineuronal nets (PNNs) are extracellular matrix structures. PNNs are expressed throughout the central nervous system, including the brain. Based on rodent studies, PNNs can act as a barrier to adult learning by wrapping around neurons to prevent plasticity. PNNs wrap around at least one subtype of the GABAergic neurons called the parvalbumin (PV+) neurons in a specific region of the brain called the cortex. The goal of my project is to determine if PNNs surround GABAergic neurons in the whole brain of an adult mouse. I hypothesize that PNNs mainly wrap around PV+ neurons, and to a lesser extent other GABAergic neurons in the whole brain. I will coronally section mice brains expressing green fluorescence protein (GFP) in all GABAergic neurons, immunostain them with antibodies against PNNs, and image the entire brain to look for co-localization of PNNs and GFP+ cells. I will further investigate the identities of the cells that are PNN+, but GFP-, by immunostaining for markers of other neurons. By using this approach, I will have a map of all the cell types that are surrounded by PNNs in the whole brain. This will allow us to investigate the identity and thereby, the function of the neurons surrounded by PNNs during adult learning and development.

Poster # 53

The Role of Statistics in Infant Word Learning

Johanna Grace Lohman

Student's Department: Interdisciplinary Programs Faculty Mentor: Hay, Jessica

Previous research has shown that 17-month-olds use between-syllable transitional probability (TP) to extract candidate object labels. The current study tests whether statistics also support word learning in more experienced language learners. Toddlers, aged 22-24 months, were familiarized with an Italian corpus containing four embedded target words: two had high TP (HTP; TP=1.0) because their syllables always co-occurred, and two had low TP (LTP, TP=.33) because their syllables also occurred in other words throughout the corpus. Using the Looking-While-Listening paradigm, toddlers were then trained and tested on four novel label-object pairings. In Experiment 1, labels were the HTP and LTP words from the corpus, and toddlers readily learned to map both word types to novel objects (ps<.05). To further probe the role of statistics in word learning, in Experiment 2 we disrupted the labels' statistics, while maintaining syllable frequency from the corpus (e.g., casa/bici caci/bi frequency syllables, but showed decreased performance on labels with infrequent syllables. Results suggest that older children continue to rely on statistics to extract candidate object labels; however syllable frequency also plays a significant role in novel word learning. We discuss how these results inform theories of statistical learning across development.

Poster # 297

The Effect of Environmental Gradients on Populus Angustifolia Growth Traits

Hung Quoc Luong

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Schweitzer, Jennifer

The earth's climate is changing faster in this century than any time in the last 65 million years, therefore understanding plant species' evolutionary responses to environmental gradients will allow for predictions of the effect of climate change on forest ecosystems. Natural environmental gradients, such as elevation and latitude, are important natural laboratories to examine genetic-based differences in phenological, or timing of, growth traits. Using a 5 year old common garden composed of Populus angustifolia that is native to the western US, ranging from New Mexico to Canada, we asked the following questions: How do genetic-based differences based on population and provenance affect leaf bud break date, senescence date, and growing season length? How do specific environmental gradients affect these same growth traits? We found that all three traits showed significant differences among populations and genetic provenances when growing in a common environment. Moreover, all three of these phenology traits were negatively correlated with latitude; patterns of precipitation, microbial communities and temperature were good explanatory variables for the population differences. Overall, these data show that there has been evolutionary divergence in response of trees showing that trees can rapidly evolve to changing environmental conditions.

Poster # 54

The Impact of Gendered Design on Social Robotics

Fiona Martin

Student's Department: Interdisciplinary Programs Faculty Mentor: Van Riemsdijk, Micheline

Robots exist as fundamentally un-gendered beings in the way we have conventionally understood gender in both humans and animals as something tied to physical characteristics, yet as they become parts of the social landscape and begin to need to interact with humans in recognizable, comfortable ways, they become perceived as gendered. This is tangible in the field of care work; labor traditionally done by (human) women, and now being replaced to an extent by robot labor that is more often than not feminized. This poster focuses on the existing literature about the gendering of robots and seek to answer the question of what is the effect, if any, of the gendering of robots on the way humans interact with them as social actors. It looks at the history of robotics with regard to gender and looks at specific cases of robots designed to work with humans in the field of care work. The main focus of this poster is on the way that humans empathize with robots as gendered beings as mediated by the design of their physical bodies and personalities, and on how this empathy helps humans to personify robots in the social arenas of jobs they fulfill.

Poster # 320

The Interaction between Ethanol Consumption and Stress and their Effect on Brain Derived Neurotropic Factor and Tropomyosin Receptor Kinase B Expression.

Katie Marie Masters

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Prosser, Rebecca A

According to the National Center for PTSD (http://www.ptsd.va.gov/), 7-8 out of every 100 people will experience post-traumatic stress disorder (PTSD) at some point in their lives. Many individuals with PTSD self-medicate with alcohol. Our experiments have found that ethanol consumption for 1 week prior to an acute social defeat (an animal model for PTSD) significantly increases stress susceptibility in mice compared to mice not consuming ethanol. In this study, we investigated the combined effects of stress and ethanol on the expression of brain derived neurotrophic factor (BDNF) and its receptor, tropomyosin receptor kinase B (Trk B). BDNF and Trk B are components of the signaling pathway that mediates stress- and alcohol-induced changes in the nucleus accumbens (NAc), ventral tegmental Area (VTA) and amygdala. We hypothesized that stress + ethanol increases BDNF and Trk B expression in these brain regions above levels in control mice and mice exposed to only stress or ethanol. We collected brain tissue from the NAc, VTA, and amygdala from mice treated as above to determine BDNF and TrkB protein expression levels using Western blots. Preliminary results revealed mature BDNF and full Trk B expression was significantly increased in tissue from mice exposed to stress + ethanol.

Poster # 321

Choline as a Mitigating Factor of Stress Induced Spatial Memory Decline in the Developing Adolescent Brain

Amanda Lynn Maxie

Student's Department: Psychology Faculty Mentor: Schulz, Kalynn

Exposure to stress during adolescence is highly correlated with an increased risk of developing psychiatric disorders in adulthood. Schizophrenia, depressive disorders, and generalized anxiety have been shown to occur in populations exposed to acute or prolonged stress during key periods of development. During prior experiments, choline, an essential nutrient that plays a major role in brain development, buffers the effects of prenatal stress in rodent models. For example, choline offsets the effects of prenatal stress on memory function and anxiety in adulthood. However, whether dietary choline supplementation mitigates the effects of adolescent stress is unknown. Currently, we are testing the hypothesis that dietary choline supplementation will mitigate the effects of adolescent stress using behavioral assays. Using a novel object spatial location task, we are able to measure the effect of dietary choline supplementation on spatial memory. This task assesses an animal's ability to recognize an object's change in spatial location. If choline ameliorates the effects of adolescent stress, we predict that stressed animals fed a control diet will not display novel location preferences, whereas stressed animals fed a choline supplemented diet will express clear

preferences for the novel object location over the familiar location. The data are currently being analyzed.

Poster # 322

Using an open feild to meassure the effects of choline on adolescent stress

Camron Grey Midgette
Student's Department: Psychology Faculty Mentor: Kalynn, Schulz

Stress during development has a negative behavioral impact later in life. Prenatally stressed rats display impaired memory and increased anxiety. Dietary choline mitigates the negative effects of prenatal stress in rats however, whether choline also mitigates the effects of of adolescent stress is unknown. We hypothesize that choline administered during adolescence will ameliorate the negative effects of adolescent stress. To test this hypothesis, rats experienced 10 days of chronic unpredictable stress during adolescence or were nonstressed. Half of these rats were fed a choline-supplemented diet and the other half were fed a standard diet. In adulthood, rats were tested in an open-field for anxiety-related behavior for 5 minutes. Rats get anxious in open spaces, therefore, rats that spend more time in the center of the open-field are considered to be less anxious. We predict that choline-supplemented stressed rats will be less anxious than the standard-diet stressed rats, and will display anxiety levels similar to the nonstressed control group. If our predictions are correct these results will demonstrate the benefits of choline at combating the negative effects of stress.

Poster # 279

TMM as a GPI-Anchored Protein in Stomatal Formation

Emily Jean Miller
Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Shpak, Elena D

Plants rely on valves called stomata for efficient gas exchange. Stomata develop through a lineage controlled by signals both internal and external to the stomatal precursor cell. TOO MANY MOUTHS (TMM) is a receptor like protein that forms heterodimers with members of the ERECTA family (ERf) receptor-like kinases to negatively regulate the stomatal development pathway in Arabidopsis thaliana. Mutations in TMM or in the ERECTA family cause stomatal clustering. Various proteins in plants and animals are attached to the plasma membrane by a Glycosylphosphatidylinositol (GPI)-anchor instead of a transmembrane domain composed of amino acids. The phenotype of the atgpi8-1 mutation in the catalytic subunit responsible for attaching GPI anchors to membrane proteins suggests the involvement of a GPI-anchored protein in stomatal formation. TMM or another protein dependent on TMM is suspected to be GPI-anchored due to the epistasis of tmm to atgpi8-1 in stem stomatal formation. Rescuing the atgpi8-1 stomatal clustering phenotype by constitutive downstream activation of the ERf signaling pathway via YODA suggests a GPI-anchored protein functions upstream of the MAP kinase cascade. Expression of the TMM functional domain with various anchors in tmm and tmm agtpi8-1 backgrounds suggests TMM function is not dependent on GPI-anchoring.

Poster # 55

The Effect of Being Overweight on ER Positive Breast Cancer

Hannah Gabrielle Mitchell
Student's Department: Psychology Faculty Mentor: Roberson, Patricia

In 2013 alone, over 40,000 women died from breast cancer, making it the second most deadly cancer (CDC, 2014). Of the cases of breast cancer diagnosed, 80% of them are estrogen-receptor (ER) positive ("Breast cancer," 2016). ER positive cancer thrives off the estrogen stored in the cancer tissue, using the estrogen to grow and develop. This is especially problematic for women who are overweight or obese (have a BMI larger than 25) because estrogen is stored in fat tissue. When a woman has extra fat tissue, there is more estrogen for the cancer to "feed on." Additionally, being overweight or obese has a worse prognosis for ER positive breast cancer because it has been shown to cause long-term low-grade inflammation. Inflammation is especially harmful because the body reacts to it by producing a certain protein which also accelerates ER positive cancer growth in post-menopausal women ("Breast cancer," 2016).

Even if women did not lose enough weight to fall within a normal weight range, but did lose some weight, they are still at a decreased risk of breast cancer. One study found that a 4-11 pound weight loss post-menopause resulted in a 20% lower risk of developing breast cancer (Van Den Brandt, 2000). The rates of ER positive breast cancer diagnosis decrease for both women who have not received a previous diagnosis as well as the recurrence rates for women who have been previously diagnosed and treated.

Obesity and being overweight is an epidemic which affects 71% of adults over the age of 20 in the United States (CDC, 2016) and weight loss is difficult for all people, not just those suffering from breast cancer. However, due to the nature of ER positive breast cancer and the effects being overweight has on it, there is an imminent need to design effective weight loss treatments tailored to ER positive breast cancer patients.

Poster # 298

THEN AND NOW : LONG TERM LAND-USE CHANGES IMPACT BOBWHITES

David Byrne Moore, Jerry Clint Shannon

Student's Department: Geography Faculty Mentor: Washington-Allen, Robert

Northern Bobwhite Quail (NBQ) populations are declining in their 25 state range. This may be due to long-term changes in land-use/land cover (LULC) that degrades bobwhite habitat. However, stakeholders have the perception that LULC has not changed and this has impeded range-wide restoration of bobwhite habitats. Consequently, the purpose of this research was to test this hypothesis of LULC change within 13 of the 25 states where land managers have provided known sites of NBQ decline. The objectives of this study were to 1) classify historical aerial photos to determine the LULC within known areas of NBQ decline, 2) extract the LULC trajectories for these areas from the National Land Cover Database change maps from 1992 – 2011, and 3) determine if there is a common LULC trajectory across the 13 states over the last 50-75 years. We used image segmentation techniques including image filters with a maximum-likelihood cluster analysis of the historical photos to produce a LULC time series for the decline in abundance sites. We consolidated the LULC time series with the NLCD and aerial photos and used cluster analysis to identify common trajectories across the 13 states. We also related the LULC trajectories to NBQ population studies.

Poster # 11

Power Lines: Perspectives on Broadband and Inequality in Rural East Tennessee

Caitlin Emily Myers

Student's Department: College Scholars Honors Faculty Mentor: Gellert, Paul

This study asks who is in favor of expanding internet access to rural and often poor Tennessee. There is a significant "digital divide" in rural Tennessee, with a recent study reporting that 34 percent of the rural population not having internet in their homes. A number of organizations concerned with rural development in Tennessee have made internet access their primary issue. Furthermore, in 2015, the FCC ruled in favor of "net neutrality" and declared broadband internet service to be a public utility. In order to understand local perspectives, this study investigates the range of opinions on broadband internet access in rural Tennessee. Based on 26 semi-structured interviews with community organizations in favor of public broadband, utility board staff, and a range of community members in Cooke and Carter Counties, I find that there is surprising commonality of perspective in favor of internet access as a necessity of 21st century life. However, there are also many who express worries about the negative effects of the spread of internet, and sometimes this stand is taken by the very same respondents. In addition, there remain grave doubts about whether internet will be managed as a public, private or partnership utility and what the cost to consumers will be. These uncertainties about price lead to doubt about whether the digital divide will be breached in the near future.

Poster # 280

Histone deacetylase inhibitors may inhibit cancer cell migration by blocking genome compaction

Darrian Ginae Nash, Peyton Hamilton Terry, Jeffrey Schoondyke

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: McCord, Rachel

Cancer's deadly nature intensifies upon migration to other tissues in the body. In order to metastasize, cancer

cells must migrate through tight, interstitial gaps. Because these gaps are small relative to the cell's nucleus, the nucleus must undergo extensive deformation to squeeze between these mechanical constraints. Histone deacetylase inhibitors (HDACi) increase global histone acetylation of the chromatin, and have been shown to decrease metastasis. However, the mechanism for this is not yet understood, and may involve differences in transcriptional regulation, or nuclear deformation. We hypothesize that increased global acetylation caused by HDACi therapeutics induces unraveling of heterochromatin to euchromatin, mechanically restricting cellular movement through tight spaces, thereby reducing metastasis. To mimic these interstitial gaps, we induced the migration of MDA-MB-231, human breast adenocarcinoma cells, through Transwell filters with 5 micron pores to induce nuclear deformation. Two HDACi drugs were used: Entinostat and Trichostatin A.We also performed further migration assays using DRB, a transcriptional inhibitor, to determine whether changes in transcriptional regulation alone would cause inhibition in migration. Utilizing immunofluorescent tags of chromatin markers H3K9ac and CBX5, we visualized the euchromatin and heterochromatin, respectively. Future directions aim to quantify genome interactions of migrating cancer cells through chromatin conformation capture analysis.

Poster # 281

Analyzing Binding Affinity of Thermosynechococcus elongatus BP-1 Ferredoxin mutants with Photosystem I by chemical crosslinking

Thao Thi Nguyen

Student's Department: Biology Faculty Mentor: Bruce, Barry

In photosynthesis, the process of electron transfer from Photosystem I (PSI) to ferredoxin-NADPH reductase (FNR) is mediated by a small mobile carrier protein- ferredoxin (Fd). The binding affinity of Fd to PSI is weak in in vivo condition and in order to apply the PSI-Fd complex in the model dye-sensitized TiO2 based solar cells, there is a requirement of an enhanced affinity between the PSI-Fd interface. This will enhance affinity and lead to a continuous electron transfer from the stromal subunits of PSI (PsaC/D/E) to Fd. We have previously engineered the WT- Fd from the thermophilic cyanobacteria- Thermosynechococcus elongatus BP-1 with a TiO2 binding peptide, LSTB1. In order to enhance the binding affinity, we have computationally determined potential mutants viz. S63D/E/W and F38A/W for LSTB1-Fd. To test the affinity of WT-Fd, LSTB1-Fd and the respective mutants with PSI stromal subunits, we have performed chemical cross linking assay using a cross-linking agent, 1-Ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC). We have optimized the right conditions to run these cross-linked products in an SDS-PAGE in terms of time and temperature. Also, the purified Fd self-dimerizes which can be eliminated by using reducing agents such as tris(2-carboxyethyl)phosphine (TCEP), β-mercaptoethanol (BME), dithiothreitol (DTT) and urea.

Poster # 323

Investigating fine motor behavior in female mouse model of Rett Syndrome

zabella Nicole Nill Gomez Ashlee Jo Tannehill

Student's Department: Interdisciplinary Programs Faculty Mentor: Krishnan, Keerthi

Rett syndrome (RTT) is a neurodevelopmental disorder that affects 1 in 10,000 females. RTT is caused by mutations in the X-linked gene, MECP2. RTT patients experience a spectrum of symptoms, which include autistic-like behavior, anxiety and motor impairment, that persists into adulthood. How MECP2 mutations cause motor impairment is unknown. Currently, we are using a clinically-relevant mouse model of RTT, the female heterozygous Mecp2 mutant, to study motor impairment. We have developed a reaching assay to analyze fine motor coordination and behavior. In the reaching assay, mice learn to reach for a food pellet. Observers blind to the genotypes analyze features such as posture, gait and grasping. The goal is to establish a set of conditions that can be used to confidently distinguish between mutant and wild-type mice. We discovered that as mice progressively learn the task, noticeable differences can be seen between the mutant and wild-type. Such differences include learning capabilities and fine motor control. We have established a paradigm to further investigate possible circuitry deficits in brain regions associated with fine motor learning, thus, furthering our understanding of the pathogenesis of RTT.

Poster # 282

Sub-cellular Localization of Arabidopsis thaliana NIP2;1 Major Intrinsic Protein, and its Effects on Hypoxia Induced Survivability

Clayton H Nunn

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Roberts, Daniel

Oxygen is vital for aerobic metabolism in eukaryotic cells. In plants, oxygen deprivation occurs frequently because of flooding stress, waterlogging, and even poor soil aeration. In addition to a reduction in energy metabolism, cellular oxygen deficiency (hypoxia/anoxia) also results in an accumulation of toxic metabolites and cytosolic acidification, further contributing to the toxicity of this stress. In response to low O2 stress, plants trigger a survival response that leads to the induction of a class of genes called anaerobic response genes (ANPs). Among the select group of ANPs in the model plant Arabidopsis thaliana, is the nodulin intrinsic protein AtNIP2;1. AtNIP2;1 is a member of the aquaporin superfamily of membrane channels. However, instead of water, AtNIP2;1 transports lactic acid, a toxic fermentation product. To investigate the role of AtNIP2;1 in mediating the adaptive response of Arabidopsis plants to low O2 stress, the survival of wild type and AtNIP2;1 T-DNA knock out mutants to low O2 stress has been investigated in the presented work. In addition, by using Arabidopsis plants expressing AtNIP2;1- fused to fluorescent protein reporters, the tissue, cellular and subcellular localization of AtNIP2;1 in hypoxia-challenged Arabidopsis plants has been studied. The findings presented here suggest that AtNIP2;1 is a root-specific protein induced acutely by anaerobic stress. By using confocal fluorescent microscopy, it appears as if AtNIP2;1-fluorescent reporter proteins accumulate in the inner cortical cells and the vascular tissue of the mature root. It is proposed that its induction and localization to these cells may be related to a where it may play a role in the transport, compartmentation and homeostasis of the lactic acid which accumulates during hypoxia induced fermentation.

Poster # 324

Whether adolescent choline supplementation will reduce the negative effects of adolescent stress exposure on adult rats

shana oltmann

Student's Department: Interdisciplinary Programs Faculty Mentor: Schulz, Kalynn

There is a strong association between stress during adolescence and an increased risk of developing psychiatric disorders such as schizophrenia, depression, and anxiety. Previous experiments performed by the lab showed that choline, an essential nutrient for brain development, when supplemented during pregnancy counteracts the effects of prenatal stress on perinatal brain development in rats. However, we do not know if choline supplementation will reduce the impact of stress when given during adolescence. With our current experiment, we will determine if adolescent choline supplementation will reduce the negative effects of adolescent stress exposure on adult rats using the elevated zero maze test. Rats prefer to spend time in the closed areas of the maze, whereas the open areas are anxiogenic. The time rats spend in the open and closed areas of the maze can be used as an index of their anxiety. If adolescent choline mitigates the effects of adolescent stress, we predict that adolescent stressed rats fed a control diet will express anxiety like behaviors in adulthood. In contrast, adolescent stressed rats fed a choline rich diet will show less anxiety-related behavior. Our data is still being evaluated. The results will be made available in time for the Eureka presentation.

Poster # 42

Cross-Generational study of the social implications of the discourse marker 'like'

Bianca Christine Ortiz, Bianca Christine Ortiz

Student's Department: Interdisciplinary Programs Faculty Mentor: Grieser, Jessica

Deborah Schiffrin is a linguist who spends time studying discourse markers. I owe much, if not all, of my research inspiration to her. My research primarily focuses on quotative like. I wanted to know how often people used it, if it was a generational marker or if people of all ages used it equal amounts. I wanted to know when people considered like unnecessary and what the social implications were of someone who 'overuses' it.

I believe people use like often, also more often than they would like to believe. I conducted a study similar to William Labov's study on Martha's Vineyard. I recorded several conversations, and later I conducted an online survey. I also held two interviews and asked them to recount a story where they felt as if they were about to die.

The subjects in their 20s exhibited more tokens of like, whereas the subjects in their late 40s had almost no tokens. The survey takers claimed like is typically that of an uneducated person. The emotionally-colored speech recordings showed a correlation between comfort of the speaker and the tokens of like.

Poster # 283

Insulin-like Peptides Discovered in Flies via Gene Cloning

Ilkyu Park, Robert Russell Schell
Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Park, Jae

Insulin is a very important hormone in mammals that is used to keep homeostatic conditions within the body. We wanted to see if invertebrates also had insulin that helped with homeostatic regulation. In order to study this possibility, gene cloning was used to understand and visualize the biological roles of possible insulin gene products by studying the DNA of Drosophila sechellia. The Drosophila sechellia' DNA was purified and analyzed to determine if there were insulin like peptides. This was done through RNA purification and reverse transcription to obtain a full-length cDNA. 3'RACE and 5'RACE was performed to amplify the target DNA fragments. Later, we were able to introduce these fragments into E. coli cultures from further autonomous amplification. Once we separated and purified our target DNA, DNA sequencing was performed to analyze the target sequences. We were able to confirm on insulin like peptide named DsILP-2 and partially confirm another one named DsILP-7.

Poster # 56

Anxiety's Relationship with Academic Performance

Brock Holden Partlow, Melanie Anne Jacobson, Jessica Lynn Anderson, Jonathan Parks Fillauer
Student's Department: Psychology Faculty Mentor: Bolden, Jenn

Extant research documents a relationship between anxiety disorders and school performance (Woodward & Fergusson, 2001; Van Ameringen, Mancini, & Farvolden, 2003; Lourea-Waddell, 2005). For example, Strahan (2002) linked social anxiety symptoms to academic problems and associated Generalized Anxiety Disorder symptoms to higher grades. Lourea- Waddell (2005) theorizes that mild anxiety severity can have adaptive qualities and can encourage individuals to better prepare for exams, term papers, and other assignments more so than students that have very little to no anxiety. The Yerkes-Dodson Law (1908) emphasized the idea that moderate anxiety symptoms allow individuals to perform better than with low or high levels of anxiety and that this relationship takes on the shape of an inverted U. In addition, according to Sarason et al (1960), as students advance through school, the relationship between academic performance and anxiety tend to strengthen, suggesting that high anxiety severity may predict low academic performance. The present study attempts to examine the relationship between current anxiety severity and grade point average (GPA) in a college student sample. We hypothesize a moderate relationship between current anxiety severity and GPA. Implications for future research and treatment options will be discussed.

Poster # 284

Abiotic stress response in Nicotiana benthamiana plants overexpressing chloroplast-resident RNA helicase INCREASED SIZE EXCLUSION LIMIT (ISE2)

Preston David Perry
Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Burch-Smith, Tessa

Environmental stresses have a major impact on plant health and crop production. It is therefore necessary to understand how plants cope with these stresses, and to this end we are examining a subset of chloroplast proteins for their roles in the plant stress response. The chloroplast is a critical modulator of plant stress responses through its role in plant hormone production and signaling. ISE2 is nucleus-encoded, chloroplast-resident RNA helicase. ISE2 expression is finely tuned in plants and its very low or very high concentration in the chloroplast compromises the plant defense response against viruses and nematodes. Little is known about the role of ISE2 in the abiotic stress response. We characterized the response of stable Nicotiana benthamiana plant lines overexpressing ISE2 (called OE plants) to drought, hypoxia, osmotic and cold stress. For this root growth, seed germination, plant weight and expression of stress-responsive genes were monitored under different stress conditions. Interestingly, our results showed that OE plants show increased resistance to osmotic and drought stress.

Poster # 325

Choline Association with Adolescent Stress in Rodents

Madison Anne Petermann

Student's Department: Psychology Faculty Mentor: Schulz, Kalynn

Depression, anxiety, and schizophrenia are mental illnesses associated with developmental stress exposure. Choline is a dietary nutrient important for multiple brain functions. In rodents, dietary choline supplements given to pregnant dams prevents the negative effects of prenatal stress of the offspring, including anxiety and memory function. Similar to prenatal stress, adolescent stress is related to numerous negative outcomes in adulthood. However, whether adolescent choline supplementation buffers the effects of adolescent stress is unknown. Therefore, we hypothesized that adolescent choline supplementation alleviates the effects of adolescent stress on social anxiety using a social interaction test. Male rats experienced 10 days of stress during adolescence or were non-stressed controls. Of these animals, half were fed a choline-supplemented diet, and half were fed a standard diet. In adulthood, animals were tested for social anxiety with an adult male partner for 8 minutes. The number and duration of sniffing contacts initiated by the experimental animal was recorded by an observer blind to experimental condition. Our hypothesis predicts that choline-supplemented stressed males will display higher levels of social contact than will standard-diet stressed males. These data are still being analyzed, and preliminary results will be presented at Eureka.

Poster # 62

Beyond Voluntourism: Sustainable International Service Learning and Field School Pedagogy at 'Ayn Gharandal, Jordan

Sara Poarch

Student's Department: Religious Studies Faculty Mentor: Darby, Erin

Although archaeology students have been coming to the Middle East for years, only recently have we seen greater reflection on the pedagogy of field school programs. The fields of tourism studies, heritage preservation, and cultural resource management have provided tools through which students may engage with professional archaeological ethics, international heritage law, and the impact of archaeological research on host communities.

In some contrast, field school education may be less structured in addressing international service and cultural exchange. Archaeological programs bring students into direct interaction with cultures that differ significantly from their own, whether on an ad hoc basis or in structured service opportunities. Nevertheless, few programs have standardized the methods and intensity of cultural orientation prior to departure or learning outcomes related to cultural impact during the season

These omissions are not without their consequences. When field school programs omit topics like sustainability and cultural exchange, this might be called "Voluntourism." Voluntourism is a form of travel in which people enact service in a shallow and non-sustainable way, sometimes to the detriment of the communities they wish to serve. A growing body of literature details the negative impact that this style of engagement has on both student learners and especially on the target community. The literature also suggests concrete steps that can limit harm, particularly related to pre-departure preparation and directed in-field refection. This paper will identify the problems with service learning implementation in field school settings in the Middle East, summarize scholarly positions that include steps toward improving student experiential learning in the field, and suggest practical implementation of these steps at 'Ayn Gharandal and the Dig Jordan field school program.

Poster # 299

First 3D Reconstruction of Internal Hydrospire Respiratory Structures in Fissiculate Blastoids (Echinodermata)

Logan Michelle Qualls, Jennifer Elizabeth Bauer

Student's Department: Geological Sciences Faculty Mentor: Sumrall, Colin

Respiratory structures of Paleozoic echinoderms have been used as a basis of classification, but have rarely been reconstructed three-dimensionally for morphological examination. Blastoids possess internal respiratory structures (hydrospires) that are lightly calcified and well-preserved. While external hydrospire expression provides the basis for classification of the two major groups (spiraculates and fissiculates), internal morphology of these structures has largely

been ignored. Our research aim is to generate new internal hydrospire models to provide additional data for future analyses such as inferring phylogenetic relationships and functional morphology simulations.

Spiraculates had a complex water flow pathway through the hydrospires, first travelling through small pores along the ambulacral edge into internal canals, and then exiting through spiracule openings at the summit. Alternatively, fissiculates had a simple water flow pathway through slits on the exterior to the internal hydrospire folds. Fissiculates account for nearly half of all blastoid genera and this work presents the first reconstructed hydrospire model for the morphotype. Prior to this study, six complete models of spiraculate hydrospires were modeled. Our study provides two additional spiraculates and presents two complete fissiculate models. These models will be utilized alongside a pre-existing dataset of external character data to test the evolutionary relationships of blastoids.

Poster # 63

Captured: Federal Financial Regulation and Income Inequality

Mary Grace Reynolds

Student's Department: Political Science Faculty Mentor: Keller, Eric

Market income inequality in the United States presents an enigma to researchers. Researching the many influences on the financialization of the United States creates issues of confounding variables, spurious results due to time-series analysis problems, and especially exploring causation. We use two uniquely constructed variables to represent governmental financial regulatory agency's effect on financialization and, in turn, determine how top income earners influence the same agency's deregulatory actions in the financial market. Essentially, we measure the U.S. governments' bureaucracy's effect on the financial market. We find the wealthy influence the Securities and Exchange Commission and the Federal Reserve Banking system to decrease regulatory activity in the financial market. This deregulatory activity then increases the financialization process in the United States.

Poster # 300

Macrobotanical Analysis of the Topper Site (38AL23)

Sierra Snively Roark

Student's Department: Anthropology Faculty Mentor: Hollenbach, Kandace

The Topper Site (38AL23) is a multi-component pre-contact site located along the Savannah River in central South Carolina. Recent excavations conducted by the University of Tennessee have resulted in the identification, mapping, excavation, and processing of over 357 features of possible pits, post-holes, and other traces of human activity. Fill from each feature was individually excavated and processed via drum flotation. This poster presents a detailed macrobotanical identification and analysis of the contents of a selection of these features using paleoethnobotanical standards. This project provides insight into Native American foodways, structure locations, and overall daily practices which occurred in the Woodland period portion of the site. Usually associated with the later Mississippian period, maize remnants have been identified and will be submitted for radiocarbon dating. Dates obtained from the botanical remains will allow for a more detailed examination of the chronologies of both ceramic technology and the spread of maize within the Southeastern United States. The results from this project have assisted in the planning for the 2017 continuation of the project and field school.

Poster # 43

Influence of College Pen Pal Program on Fourth Grade Writing Attitudes

Gretchen Lorena Roberts, Carly Ann Chwat, Peter Lawrence Ignacio, Victoria Gail Vanmaaren, Stephanie Krider Daniels, Madeline Birch Auge, Janet Elaine Schwartz-Micheaux

Student's Department: Psychology Faculty Mentor: McCurdy, Merilee

Attitudes towards writing in early elementary schoolers fluctuate as students advance through the writing curriculum from year to year (Chohan, 2010). Research suggests pen pal writing exercises provide a more authentic purpose for writing and may improve writing attitudes for students. We introduced a pen pal program between graduate students at the University of Tennessee and fourth graders at an East Tennessee elementary school to examine how attitudes towards writing would change for participating students. The Writing Attitudes Survey was given before the pen pal program began and will be given again at the conclusion of the four-month study period. Over these four

months, fourth graders and graduate students will correspond on a weekly basis. We hypothesize that after writing to a pen pal for four months, the attitudes of fourth graders will improve, as will their spelling and overall writing production.

Poster # 301

Assessing Human Body Measurements for the Golden Ratio

Kirsten Salonga, Charis A Maness, Hayley Nicole Phillips

Student's Department: Ecology/Evolutionary Biology Faculty Mentor: Ganguly, Nivedita

The purpose of this research was to determine whether the golden ratio (Φ), an irrational number that appears in nature and mathematics, is present in different anatomical features in humans and whether there is a divergence from the ratio based on five age groups (1-12, 13-19, 20-30, 30-50, 50-100) and sex (male and female). We measured the humerus, the ulna, the radius, the carpals, the metacarpals, the phalanges, and the cranial bones of about forty live specimen per previously specified age group, both male and female, in order to calculate the ratios needed for the experiment. We then used a JMP T-test to observe any differences in ratios based on sex and an ANOVA test and Tukey HSD test to determine differences in ratios between age groups. We also examined which ratios from each gender were closest to the golden ratio. The results of the JMP T-test showed that the ratios of the elbow to the fingertip and the elbow to the wrist were significantly different between sexes in ages 1 to 12, and the ratios of the length of the face to the width of the face were considerably different between sexes in ages 20 to 30. From the ANOVA and the Tukey HSD Tests, we determined that among age groups, the ratios of the elbow to the fingertip and the elbow to the wrist were not significantly different, but the ratios of the length of the face to the width of the face were significantly different.

Poster # 302

Metapleueral Gland Secretion Methods to Assess Myrmecochory Interactions

Kirsten Salonga

Student's Department: Ecology/Evolutionary Biology Faculty Mentor: Kwit, Charles

Our research purpose was to answer the following question: Do ant antimicrobials provide an additional benefit to plant pathogen defense? Metapleural gland secretions may provide defense against plant fungal pathogens within the myrmecochory interactions. Infectious diseases can spread rapidly between social insects such as ants, due to the continuous interactions between genetically-identical individuals (Baer and Schmid-Hempel 1999). In myrmecochory, there is a distinct mutualism between plants and ants, in which seeds are placed in settings which increase the likelihood of survival and seedling establishment, in comparison to lack of dispersal, and ants receive food from elaiosomes, fleshy appendages on seeds. Within this mutualism, ants may further aide plants in seed dispersal by allowing them to resist their own microbial pathogens.

Poster # 44

The Children's Book of World Religions

Kirsten Salonga

Student's Department: Ecology/Evolutionary Biology Faculty Mentor: Scott, Rachel

While there are many illustrated books which teach children about religions such as Christianity and Judaism, there are few children's books which tell stories from multiple religions. Due to my background in visual art and my wish to learn more about some of the most prominent religions, I have self-illustrated and self-written The Children's Book of World Religions, which contains tenets and main stories from eleven major religions: Animism, Confucianism, Daoism, Judaism, Hinduism, Buddhism, Christianity, Islam, Atheism, Agnosticism, and New Age. The artwork was created with watercolor and markers.

Poster # 285

IDENTIFICATION OF A GENERAL TARGETING MOTIF GUIDING INTERACTION BETWEEN NUCLEAR-ENCODED PLASTID PRECURSORS AND THE TRANSLOCON OF THE PLASTID OUTER MEMBRANE.

Erika Nicole Sanders

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Bruce, Barry

Eukaryotic organisms are defined by their compartmentalization and various organelles. The membranes that define these organelles present a barrier to protein sorting and require complex nanomachines (known as translocons) to selectively mediate the import of proteins from the cytosol where they are synthesized into the organelle. The

chloroplast possibly represents the most complex system of protein sorting, requiring many different translocons located in the three membranes found in this organelle. Proteins destined for the chloroplast are encoded with a precursor that contains a special "zip code" at their N-terminus appropriately called a transit peptide (TP). The TP is recognized by machinery in the Translocon at the Outer envelope membrane of Chloroplasts (Toc). This recognition event is the first step in the general import pathway in chloroplasts. However, our understanding of plastid import is complicated by the divergence of TP sequence and structure. Although TPs do not share a consensus sequence for translocation, there are several physicochemical motifs that contribute to targeting and import. One of such motifs is a region that interacts with the Toc receptor proteins, which appear to promote TP binding, but cannot support import alone. This region is termed 'FGLK,' defined as having the following: an aromatic a.a.; a turn-inducing or helix breaking a.a.; a small nonpolar aa; a basic a.a., and lacking any negatively charged a.a. To investigate the universality of this motif we designed a heuristic approach to identify other precursors containing this motif in the Arabidopsis genome. Selection criteria thinned the genome to 24 preproteins containing precursors predicted to target the plastid, all between 50 and 60 a.a. in length, and containing at least one FGLK motif. These precursors were then further analyzed using seven localization indices. The output from these prediction tools was integrated into a scoring algorithm to select the final 7 most confidently predicted chloroplast proteins, while avoiding potentially dual-targeted proteins to the mitochondria. We have developed an in vivo assay to assess the import efficiency of precursor protein constructs by using a chimeric transit peptide-fluorescent protein (FP) construct. The FGLK domains have been substituted in each model TP to analyze their subcellular localization using fluorescence microscopy. Additionally, we have developed methodology that allows us to quantify the cytosolic pool versus correctly imported protein. Using an in vivo approach, we can obtain mechanistic insight about the role of the FGLK motif in the import process. Our work is expected to make a major step forward in the understanding of the functional motifs in TPs.

Poster # 303

Seroprevalence of T. gondii infection in the Knoxville Zoo

Matthew Douglas Scott

Student's Department: Microbiology Faculty Mentor: Su, Chunlei

Toxoplasma gondii is a ubiquitous protozoan parasite that infects mammals and birds. It is the causative agent of toxoplasmosis in humans and animals. T. gondii has two infectious forms, including oocysts shed from feces of felids, and tissue cysts from chronically infected animals. Toxoplasma can be transmitted through ingestion of oocysts in contaminated food or water, consumption of tissue cysts, or vertical transmission. Infection in humans may cause severe systemic toxoplasmosis, congenital disease in newborns, or encephalitis in immunocompromised patients. In this study, we determined the prevalence of T. gondii in Knoxville zoo animals using a serology test. From 122 serum samples collected from 43 mammal and bird species, 39 (32%) were positive. Logistic regression was used to evaluate the association of age, weight, feeding pattern, vertebrate class, and year of sampling to seropositivity. The results showed that age was positively correlated with seropositivity ($p=0.032$), indicating constant exposure of these animals to T. gondii. Overall, our findings indicate high prevalence of T. gondii within the Knoxville Zoo, suggesting contamination in the environment or feed. We recommend control of feral cats in the zoo area to safeguard susceptible species such as marsupials or New World monkeys.

Poster # 330

Improved sinkhole detection and mapping for Knox County, TN with LiDAR data

Jerry Clint Shannon, David Byrne Moore

Student's Department: Geography Faculty Mentor: Li, Yingkui

According to USGS, sinkholes over the last 15 years have caused an average of over 300 million dollars worth of damage per year in the US. Sinkholes near or on roads are especially costly and occasionally deadly. Knox County and much of East Tennessee contain karst geology, deeming it at risk for sinkholes caused by this porous, soluble type of rock. Currently, Knox County uses 4' resolution contour data to map sinkholes and potential sinkholes. In this project we develop a more accurate LiDAR-based GIS layer to show the potential locations and extents of sinkholes surrounding the Dutchtown Road area of Knox County. Knox County Stormwater Management is providing data and will use the project

as a pilot for consideration of a larger project. This project also aims to eliminate the non-sinkhole depression features from the current Knox County Stormwater Management contour-based layer. We will further analyze the underlying geology in the study site to determine possible sinkhole locations not found by in the surface map with geologic maps provided by Knox County Stormwater. Lastly, we will assess the accuracy of the new method for prediction and location of sinkholes.

Poster # 57

Tornado Watch and Warning Understanding in Tennessee Counties

Chesnea A Skeen

Student's Department: Geography Faculty Mentor: Ellis, Kelsey

Tornadoes present a significant threat to life and property. While the NWS warning system informs the public of tornadoes, if these warnings are not heeded by the public, the potential fatalities and destruction of property cannot be minimized. In order to prevent further loss of life and property, it is necessary to understand how the public understands the warning system. This paper aims to understand the correlation between understanding of watches and warnings and the occurrence of tornadoes, as well as how understanding varies spatially. Survey data was collected from 12 Tennessee counties on watch and warning understanding and compared with tornado GIS data from the NOAA SPC tornado database. Survey responses were coded into categories to determine correctness by county, compared and mapped. There is a slight positive correlation between occurrence of tornadoes and poor understanding, confirming that where tornado understanding is most vital, it is lacking. Warning understanding is less correlated with tornado occurrence than watch understanding. The Memphis area has the poorest watch understanding. Warning understanding is the worst in the Knoxville area and best in the Nashville area. While these results are preliminary and subject to change, they highlight a need for future research and outreach.

Poster # 58

The Social and Demographic Factors of ER Positive Breast Cancer Medication Adherence

Aubrey Hope Southerland

Student's Department: Psychology Faculty Mentor: Roberson, Patricia

Breast cancer in women is pervasive as individuals have a one in eight chance of being diagnosed in their lifetime ("Making Strides Against Breast Cancer", 2016). Those affected are forced to reckon with this tragedy; however, the tragedy is not just the cancer itself. Many individuals feel greater side effects due to the prescribed medication post-recovery (intended to prevent relapse of cancer); this particularly true for Estrogen positive (ER+) breast cancer. Post-recovery, ER+ patients are prescribed ER blocking medication to inhibit the hormone from accelerating any cancer growth for 5 years. However, the reported side effects are substantial. In fact, according to McCowan (2008), low adherence to tamoxifen, a Type of ER inhibiting medication, increases the risk of death. Therefore, when discontinuing the medication, patients have lower survival rates and a lower quality of life. However, medication also assumes that patients have access to either insurance with low prescription deductibles or higher income to pay for prescriptions over 5 years.

Freedman (2010) states that uninsured women are at lower odds of receiving ER+ inhibiting medicine because of the high copay; these women are confronted with much higher medical bills because of their lack of benefits. Additionally, Neuget (2011) found that women over the age of 65 are more likely to be adherent to their medication; perhaps this is because these women are more likely to be on a fixed income with steadier insurance as they have been working longer. Furthermore, patients who are older, who are on more medicine than just one single prescription, who are single by marital status, who have higher staged cancer, who are estrogen receptor positive, who are receiving radiation and not chemotherapy, and who are being diagnosed in a smaller community hospital are more likely to complete treatment and medication (Kimmick, 2009). These factors together are proven to increase likelihood of adherence, but of course they do not always happen simultaneously. If these patterns indeed exist and the patients cross the one-year threshold of taking their medication, Owusu (2008) reports that the women would be more likely to continue, considering that most nonadherence occurs in the first year of treatment.

Poster # 59

"I'm from here": Immigration politics and urban livability in Copenhagen, Denmark

Elizabeth Hope Stanfield
Student's Department: Geography Faculty Mentor: Van Riemsdijk, Micheline

More than half of the world's population today lives in urban areas. As such, designs and development of urban built environments are crucial to understanding social issues. Urban livability is a popular design approach that aims to improve quality of life through urban planning. Yet positivist urban livability approaches may obscure complex processes of exclusion. This article examines how urban livability has been applied to two parks in Copenhagen, Denmark. These parks, Mimersparken and Superkilen, have been lauded as exemplary applications of urban livability principles in a neighborhood with a large immigrant population. Residents' lived experiences, however, are more complex. Through interviews with residents, designers, and local activists we find:

- urban livability cannot be applied universally to all contexts;
- livability is deeply affected by political and economic processes influencing who is included in the "public";
- despite exclusion and marginalization, residents shape and contest meanings of the parks and their neighborhood.

Poster # 286

The effect of 2B4 deficiency on T-cell differentiation and transplant rejection.

Phoebe Catherine Stark
Student's Department: Biology Faculty Mentor: Alexandre, Gladys

Previous studies from our group suggest that expression of 2B4, a cosignaling protein expressed on subsets of CD8+ T cells, may be associated with improved graft survival following transplantation. In order to elucidate the effect of 2B4 on T cell activation, proliferation, death, and bioenergetics, CD8+ 2B4 knockout TCR transgenic T cells specific for a single, graft-expressed antigen (OT-I) and wild type (WT) OT-I controls were stimulated with cognate peptide in vitro for three days. Flow cytometry was used to assess differences between WT OT-I and 2B4KO OT-I cells at 0, 24, 48, and 72 hrs post stimulation. Interestingly, we observed that fewer 2B4KO OT-I T cells underwent division as measured by dilution of intracellular dye at both 24 and 72 hours post stimulation. We hypothesized this may be due to increased cell death. To test this, we repeated the experiment and analyzed the number of apoptotic T cells. We found no difference in cell death between 2B4KO and WT T cells. However, expression of CD127 and CD62L, two markers that are highly expressed on naïve T cells, was retained on activated 2B4KO T cells relative to WT controls. This indicated that 2B4KO T cells may have a reduced capacity to differentiate into effector cells. In summary, these data are consistent with a costimulatory role for 2B4 in augmenting differentiation and proliferation following T cells activation. These findings may contribute to the development of new 2B4-targeting immunotherapies to inhibit donor-reactive CD8+ T cell responses and prolong graft function following transplantation.

Poster # 287

Myosin XI Isoforms: Role in the Plant Cold Response

Avery N Sukienik
Student's Department: Biology Faculty Mentor: Nebenfuehr, Andreas

Class XI myosins are plant motor proteins that transport organelles along actin bundles to drive cytoplasmic streaming. Trafficking is important for cellular expansion, especially during polarized growth of root hairs. Arabidopsis thaliana encodes 13 myosin XI isoforms. mya2 and xik mutants exhibit in shorter root hairs while mya1 and xib do not. mya2 xib double mutants exhibit significantly shorter root hairs indicating functional redundancy; however, the function of myosins in the cold response, where root length (RL) decreases while root hair length (RHL) increases as temperature decreases, is unexplored. We hypothesize that the loss of essential myosins will result in a decreased cold response.

To address this, we analyzed RL and RHL of myosin mutants at 22ºC, 16ºC, 12ºC, and 8ºC. While mutant and wild type (WT) RL is similar at each temperature, RHL of mya1 mutants increases more than WT as temperature decreases. Additionally, xik xib mutants exhibit RHL elongation only at 8ºC. mya1 mya2 mutants display normal cold responses, but their RHLs at 8ºC are similar to those at 12ºC. This suggests that myosins perform different roles in the cold response;

specifically, mya1 mutants appear more sensitive, while other mutants are less sensitive to cold treatment.

Poster # 304

Observing Ant Grooming and Allogrooming Behaviors

Sierra Joan Swanson
Student's Department: English Faculty Mentor: Kwit, Charles

Social animals have a higher risk of contracting diseases. Ants are social insects that live in colonies, and ants exhibit behaviors to lessen the risk of spreading disease. One such behavior is grooming. Ants actively groom themselves (self-grooming) and other individuals (allogrooming) within the colony, which has been shown to reduce pathogen spread. Here we investigate ant grooming behaviors at varying levels of exposure to Beauveria bassiana, a common, generalist entomopathogen. We monitor ant pairs at different exposure levels for grooming and other interactions for 10 minutes after initial exposure. Preliminary results indicate that frequency of grooming after initial exposure work to reduce risk of disease spreading through the colony. Initial contact and grooming behavior also suggests that ants can detect fungal spore presence and immediately react to remove spores. This project is a component of a larger project looking at the effect of diet on ant colony survival and will increase understanding of how different aspects of ant colony living interplay to defend against pathogenic fungi.

Poster # 305

Quantitative Analysis of Microbial abundance within Arctic Fjord Sediments Assessed Through Direct Counting

Alex Taylor Swystun, Rachel Elizabeth Winstead
Student's Department: Biology Faculty Mentor: Lloyd, Karen

Microbes found in the marine sediments are responsible for the production of nearly half of the carbon dioxide found in the atmosphere (Arrigo). The fjords in Svalbard (79°N) are not considered typical marine sediments, because high iron content influences unique subsurface redox chemistry. Radiotracer studies have shown that these sediments contain active bacterial sulfate-reducing communities (Finke et al., 2006). In addition to bacteria, archaeal cells within these sediments have been found in aggregates encompassed by sulfate-reducing bacteria (Ravenschlag et al., 2001). These anaerobic organisms participate in mediating environmental biogeochemical cycles, including the oxidation of methane (Ravenschlag et al., 2001) and iron reduction (Vandieken et al., 2006). These observations have led to understanding the important role that these microbes play in global nutrient cycling and have led to recent interest in how these communities will respond to glacial retreat associated with climate change (Arrigo 2005). However, the abundance of microbes across fjords in Svalbard is relatively unknown. Here, we show the abundance of microbes in sediments from two virtually unstudied fjords, Van Keulenfjorden and Kongsfjorden. We found a general trend of lower microbial abundance after around 10 cm in depth. For relative abundance, we saw numbers around 107 cells per ml in Van Keulenfjorden, which is slightly lower than counts of 16S copy numbers acquired through quantitative PCR (qPCR). Our results demonstrate that there are varying levels of microbial abundance in the fjord sediments of Svalbard. Using alternative methods, we can test for large cell yield loss on samples, this allows us to be sure our sampling was done correctly. Moving forward, this research could help contribute to a better understanding of the effect that these microbes have on nutrient c

ycling at both a local and global level by coupling abundance data with functional analyses. Furthermore, we hope that this research will enhance the ability of predicting the effects that climate change and glacial runoff have on these microbial communities and carbon cycling in the Arctic Circle.

Poster # 306

GIS Accuracy Assessment of Forested Wetland Predictive Model for TVA

Taylor Elizabeth Tieche
Student's Department: Geography Faculty Mentor: Li, Yingkui

Tennessee Valley Authority (TVA) is one of the leading providers of electricity in the southeast. In addition to energy, TVA also focuses on land conservation and strives for minimal impact on the land. One way that TVA accomplishes this goal is by mapping forested wetlands and planning utility lines so that they have minimal impact on

these high-value environmental areas. To accomplish this, TVA has developed a predictive model designed to map the location of forested wetlands within the area. This allows for the transmission team to avoid forested wetlands without having to send a team into the field to walk the line. For my senior honors thesis, I have developed a method to assess the accuracy of this model. I am comparing field-mapped wetland polygons with modeled wetland polygons using ESRI Model Builder. I have created a tool that will use these two datasets to produce a percentage that represents the accuracy of this model. Using this tool, I can assess the accuracy of different datasets TVA uses, and can either give TVA confidence in their model, or inform them that it needs improvement if it is to be used in lieu of fieldwork.

Poster # 60

Parker Academy Research Project

Kierra N Toney, Amanda Brooke Adams, Tiffany Nichole Cantrell, Maygen E Lee, Jennifer Steinmann

Student's Department: Sociology Faculty Mentor: Boyd, Karen

The Parker Academy, also known as the Clermont Academy, is historically significant for the history of educational leadership. This school is theorized to be the first of its kind in regards to having taught male and female as well as black and white students at the same level. In 1839, when this school was founded, just across the very near Ohio river slavery was still intact. The circumstances of location, time, and people involved are what make the Parker Academy unique. The Ohio river valley had played an active role in the underground railroad fostering an active, covert abolitionist community in the area. The Parker's created a place to free the minds of those enslaved by the racial caste. This historical qualitative case study examines the Parker family's leadership of social change through their work at the Parker Academy with specific attention to:

- how and why did the Parkers lead societal change?
- What did they do, educationally, to effect this change?

Using the Social Change Model as a conceptual framework, we will look at four Parker family manuscripts recalling the establishment and leadership of the Academy and other artifacts from the school to answer these questions.

Poster # 331

Neutron-mirror neutron oscillations in a residual gas environment

Louis James Varriano

Student's Department: Physics and Astronomy Faculty Mentor: Kamyshkov, Yuri

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. Three separate experiments have been performed in the last decade to detect the possibility of neutron-mirror neutron oscillations. In the analysis of the data of these experiments, the effect of the presence of residual gas (due to an imperfect vacuum) was not considered. This work provides a formalism for understanding the interaction of the residual gas in experiments with ultra-cold neutrons. This residual gas effect that was previously considered as negligible has an impact on the probability of neutron to mirror neutron transformation. This formalism is used to evaluate the three previous experiments and provide a small correction to these experiments. The density matrix formalism also provides a framework for the future mirror matter search experiments and can be used to evaluate experiments for effects from the presence of mirror matter and from a mirror magnetic field, which have not been considered before. Furthermore, the formalism is applied to neutron-antineutron oscillations for potential future experiments.

Poster # 326

Establishment of Olfactory Trap Assays to Measure Olfactory Perception Behavior in Drosophila melanogaster (Fruit Fly)

Richard Vuong
Student's Department: Biochemistry Faculty Mentor: Park, Jae H

Throughout evolutionary history, organisms have used smell to differentiate between harmful and beneficial substances. Finding food, avoiding predators, and searching for mates all depend on the olfactory senses. However, the molecular neurobiological mechanisms underlying olfactory perception is still not well understood. The fruit fly D. melanogaster is an excellent model organism to employ, because of its chemosensory system. A prerequisite to this study is to establish reliable behavioral assays that will provide quantitative measurements of olfactory perception. To do this, we designed various 'olfactory trap devices' and tested flies with the W1118 gene, because this gene elicits blindness on the flies, and thus emphasizes the olfactory senses, for their attention to known attractants (apple cider vinegar and yeast). As a result, we found that the majority of flies responded to the attractants within 20-48 hours. Different concentrations were also implemented to determine the sensitive of smell perception in flies. 1% diluted vinegar solutions had similar results with the originally tested 5% vinegar, while 0.1% and 0.05% vinegars had less consistency. With these results and having this assay in hand, we will test various mutant flies to gain insight into the roles played by these genes in olfactory sensing and behavior. This study will then provide a foundation for future research of the molecular and cellular mechanisms of smell perception in vertebrate animals.

Poster # 288

Interactions of Trehalose with Model Folate Compounds

Carolyn R Ware
Student's Department: Biology Faculty Mentor: Howell, Elizabeth E

Folate (vitamin B9) is an essential element in cellular metabolism. Folate is obtained from dietary intake, as the human body is unable to produce it, and it is required for the synthesis of many basic subunits used to compose both DNA and RNA. Previous studies have shown that folate interacts weakly with osmolytes, small molecular weight compounds produced by the cell when under stress, when the cell is crowded with them. Moreover, it has also been demonstrated that there is weaker binding between dihydrofolate reductase and dihydrofolate in the presence of these osmolytes and when the cell is under osmotic stress. Because of these results, we are interested in the mechanisms through which these enzyme-osmolyte interactions occur. This study uses Vapor Pressure Osmometry to determine the type of interactions that occur between trehalose (a common cellular osmolyte) and various compounds that mimic side chains found on folate. Through our studies, we have found positive preferential interaction coefficients for reactions between trehalose and various amino acids, amino acid salts, amides, carboxylic acids, and carboxylate salts, meaning that these compounds prefer to interact with water rather than trehalose. Using these results we will be able to understand how trehalose interacts with various atom types.

Poster # 289

The Side Effects of Estrogen Inhibiting Medication and the Links to Family Research

Brooke M Welch, Kaitlyn Lee Wright, Haley E Wilder, Tori Renee Richardson
Student's Department: Psychology Faculty Mentor: Roberson, Patricia

Estrogen positive (ER+) breast cancer makes up 80% of all breast cancer diagnosis (WebMD). This type of breast cancer is diagnosed when there is an abundance of estrogen in the patient's body, in which the cancer cells grow. One of the reasons for this low remission is estrogen-blocking hormone therapies, which is medication prescribed to the survivors. If a patient is ER+ that means that the cancer cell grows in response to the hormone estrogen. Arimidex, aromatase inhibitor, reduces large amounts of estrogen that are produced in these ER+ breast cancer patients. In observing medical research, I have found it interesting to look into the side effects because mostly when these individuals are started on Arimidex, which has a main side effect of joint pains/ aches, but the patients have arthritis or osteoporosis.

Poster # 45

Crip and Queer: The Heroism of Kattrin in Brecht's Mother Courage and her Children

William Wesley White

Student's Department: English Faculty Mentor: Anderson, Misty G

One of the essential elements of theatre is dialogue. Discussion between characters make up the bulk of almost all plays, and the verbal conveyance of emotion and thought is crucial for analysis. How, then, do we analyze a character who has no dialogue? If a prominent character never speaks, we must not only examine their in-text descriptions and blocking, but why they have no voice. An iconic mute character is Kattrin, the war-scarred and forlorn daughter of Brecht's eponymous Mother Courage. Kattrin is a true rarity not only because she is disabled, but because she is inherently queer: she is never the object of desire for any man, and she shows sexual longing towards Yvette, a female prostitute. Both the disabled and queer communities have been historically marginalized, and during the time of Brecht their fate seemed similar to Kattrin's: they had no public voice. The intersectionality of sexuality and disability, as well as gender, is embodied in the character of Kattrin. Through vigorously beating her drums at the behest of the male soldiers, Kattrin dies as the play's true hero, and transcends the limitations of her disability; she utilizes a voice louder than mere words.

Poster # 290

Examining the role of myosin XI-I in nuclear shape and position in A. thaliana

Ian Andrew Windham

Student's Department: Biochem/Cellular/Molecular Bio Faculty Mentor: Nebenfuehr, Andreas

Myosins are a large superfamily of molecular motors, wherein class XI myosins are encoded solely in plants and typically function in rapid intracellular transport along actin filaments. Intracellular transport is especially important in polarized cell growth exemplified in root hairs, which are extensions of single epidermal root cells. In Arabidopsis thaliana, the atypical myosin XI-I binds to the WIT-WIP complex on the outer nuclear envelope. Nuclei of xi-i mutants move more slowly and are more circular than wild-type. However, the specific function of myosin XI-I is not fully understood. We hypothesize that myosin XI-I functions in conjunction with other cytoskeletal elements in maintaining nuclear position and shape. We found that nuclei of growing root hairs in xi-i maintain a more variable distance from the tip, with a mean variance of 14.54±7.77, compared to a mean variance of 9.84±5.90 in wild-type. xi-i nuclei were also more circular, with a mean circularity index of 0.558±0.142 compared to 0.474±0.107 in wild-type. Interestingly, disruption of microtubule polymerization by treatment with 5 µM oryzalin in xi-i caused root hair nuclei to move back towards the root surface. This implies an as of yet uncharacterized mechanism potentially involving microtubules in nuclear position and shape.

Poster # 307

ASSESSING MICROFOSSIL TAPHONOMY WITH HIGH-RESOLUTION IMAGERY

Robert Seth Wood

Student's Department: Earth/Planetary Sciences Faculty Mentor: Kah, Linda C

GigaPan mosaics stitch multiple images into a single file with a broad field of view and prodigious detail. Here we use GigaPan mosaics to analyze 1.2 billion year old fossilized microbial mats. By allowing rapid shifts between mesoscopic and microscopic views, Gigapan mosaics allow individual microfossils to be observed within the framework of the mat fabric. We specifically used GigaPan images to assess the overall preservation of microbial mat fabrics, using a modified form of quadrat sampling, that is common in ecological studies. This method assesses the taphonomy (i.e. the morphological preservation) of individual microfossils within a quadrat, assuring data on both common and rare forms. To complete analyses, each GigaPan image is split into 25 partitions and saved as lossless TIF files. Partitions are overlain by an 8*8 grid, creating a total of 64 quadrats per partition, or 1,600 quadrats per thin section. A random number generator chooses 25 values, corresponding to one quadrat per partition, from which data is collected. Modularity allows new data sets to be built upon previous analyses, until taphonomic analyses are complete. Our experiences with microbial mats demonstrate that quadrat analysis of GigaPan images provide a means to accurately describe spatially complex data.

College of Communication and Information

Poster # 64

Disclosure Patterns among Gynecologic Patients

Clint Garrison Graves
Student's Department: Communication Studies Faculty Mentor: Violanti, Michelle

The provider-patient relationship is inherently different from other interpersonal relationships due to reciprocity violations with regard to self-disclosure. Inherently, the relationship is inequitable because patients are consistently disclosing incredibly intimate information to relative strangers. Communication Privacy Management (CPM) provides a framework through which to study these abnormal disclosure patterns. We examine the relationship between honest patient self-disclosure and four factors that may affect those patterns: trust in the physician, situational communication apprehension, health literacy, and the sex of the physician. With a sample of 119 females, at least 18 years of age, that have experience with a healthcare provider in gynecologic capacities, we test the effects of these variables on the level of honest selfdisclosure from patients. We find that there are significant positive relationships between selfdisclosure and trust in the physician and health literacy. There is a significant negative relationship between self-disclosure and communication apprehension. We find no significant difference between self-disclosure patterns based on sex of the physician. Our findings have direct applicability for provider practices. In turn, we make provisions for future research that will investigate our findings more thoroughly in order to best inform gynecologic provider practice.

Poster # 65

The Influence of Cultural Dimensions on Conflict Communication Patterns

Alexandra Adrianne Nelson, Karlie June Crawford, Leah Elaine French, Elizabeth Tennessee Davis, Christopher J Stovall
Student's Department: Communication Studies Faculty Mentor: Violanti, Michelle

This research looks to explore the relationship between the cultural dimension of individualism and collectivism and the five conflict types (Avoiding, compromising, dominating, integrating, and obliging). The effect of cultural dimensions, such as individualism and collectivism, are necessary to study in order to gain a better understanding of how culture can impact conflict communication patterns and our study sought to understand if there was a significant relationship between the two variables. We conducted this research at a large southern eastern university and utilized multiple research methods. Both surveys and interviews were conducted in order to gain insightful and diverse results through a combination of quantitative and qualitative methods. Overall, our qualitative research revealed that individualism and collectivism directly impacts conflict management type, while our quantitative results did not support these conclusions. In light of this discrepancy, more research is encouraged in order to understand the differences between the enactment versus perception of conflict communication for different cultural groups. Furthermore, our study reinforces the importance of a diverse participant pool in understanding these nuances in conflict communication. These results create a path for further thought, research, and consideration in the way we conceptualize and operationalize the intersection between communication and conflict when viewed through the different lens cultures provide.

Poster # 66

HPV Vaccination Receptivity: How Provider Messaging Influences Patient Receptivity

Katie Danielle Scott
Student's Department: Communication Studies Faculty Mentor: Violanti, Michelle

The human papillomavirus (HPV) infection is a prevalent health concern for college students. The HPV vaccine has the power to significantly impact rates of infection. This study sought to understand how the strength of a provider's recommendation for the HPV vaccine impacted perceived quality of medical care (PQMC), as well as how PQMC impacted willingness to pursue vaccination. In a quantitative survey with a sample of 126 participants ages 18 to 26, a positive correlation was found between strength of recommendation and PQMC. A positive correlation was also found between PQMC and willingness to pursue vaccination. No difference was found between male and female participants in how they assessed strength of recommendation. The study's implications show that stronger recommendations are positively correlated to higher perceived quality of medical care, meaning providers may feel comfortable knowing that making assertive recommendations for vaccines will not lower a patient's PQMC. Equally as important, if an increase in PQMC is correlated to an increase in willingness to pursue vaccination for HPV, providers may need to focus on how they can exhibit the six traits that lead to a higher PQMC while making their recommendation.

College of Education, Health, and Human Sciences

Poster # 77

Social support and mothers' perceptions of parenting difficulties among the Gamo people in Southern Ethiopia

Julia Laine Allison

Student's Department: Social Work Faculty Mentor: Fouts, Hillary

Psychosocial support fosters development of internal and external capital required for children and families to build resilience and cope with adversity. Across the globe, a wealth of research exists emphasizing the consequences felt by families subjected to deficient psychosocial support systems. However, results of these investigations chiefly focus on the negative outcomes faced by children reared amid such circumstances, rather than attending to the root of the consequences—the encumbrance of stress felt by parents suffering from a lack of support. Additionally, much of this research has been conducted in industrialized nations. The proposed study will explore associations between mothers' self-reported parenting difficulties and social support in the home, including paternal presence. The data for this study includes naturalistic observations of 27 Gamo children (12-24 months) and their caregivers, as well as qualitative interviews with the mothers of each focal child. A content analysis of the qualitative interviews will be used to identify themes in the mentions of difficulties or stressors related to parenting and intragroup group variations in the frequency and types of difficulties mentioned. Variations in the frequency and types of difficulties mentioned will then be examined in relation to observed and reported social support.

Poster # 78

Maternal and Infant Factors Associated with Spit-Up Estimation Accuracy

Rebecca Zuchowski Cepeda

Student's Department: Nutrition Faculty Mentor: Kavanagh, Katie

Anecdotal evidence suggests parents believe infant spit-up results in significant calorie loss, possibly leading to overfeeding and/or inappropriate introduction of solid foods. However, little is known about the actual calorie loss from normal bouts of infant spit-up. Our previous work indicates average calorie loss is probably quite modest (~5%). Therefore, the objectives were to assess, via an online survey, mothers' ability to accurately estimate spit-up amounts using photographs of known quantities and to explore factors potentially related to accuracy. Mothers of healthy, term infants < 6 months old, were eligible. Along with demographic and infant-feeding questions, mothers were asked to estimate the amount of spit-up shown in a series of randomized photos. Preliminary analysis of a sample of 46 mothers indicated mothers were ~33 (+ 4.9) years old, 85% were White, 59% had > a bachelor's degree, and 44% were low-income. Infants were ~4 (+2.0) months old at survey completion, and the majority were female (59%). Preliminary analysis of an image representing 1 tablespoon of infant spit-up indicated 24% of mothers accurately identified the amount, while 54% provided an overestimate. These limited preliminary results indicate a potential intervention topic that may attenuate concern with infant calorie loss via normal spit-up.

Poster # 79

Effects of Zyflamend Treatment on Adipogenesis

Tory Danielle Frankel

Student's Department: Nutrition Faculty Mentor: Bettaieb, Ahmed

Background: Disorders of body mass regulation such as obesity are increasingly common causes of morbidity and mortality. Obesity represents a major public health problem and identifying natural compounds that modulate energy balance and glucose homeostasis is of interest for combating obesity and its associated disorders. Zyflamend, touted as a natural herbal extract to treat inflammation, is credited as being able to benefit many other conditions such as cancer, inflammation and osteoporosis. However, its effects on metabolic diseases and obesity in particular, remain largely unexplored. Objective: The objective of this study is to investigate the effects of Zyflamend on adiposity and glucose homeostasis. Methods: We determined the metabolic effects of Zyflamend treatment on differentiation of adipocytes and lipogenesis. Results: Zyflamend treatment inhibited lipid accumulation during differentiation of white pre-adipocytes, consistent with a decreased expression of lipogenic genes. Conclusion: These studies identify Zyflamend as a potential regulator of adipogenesis and potentially energy balance and obesity.

Poster # 80

The Combination of Dietary Zyflamend+WholeMega Fatty Acid Supplementation Inhibits Intimal Hyperplasia

Taylor Marie Harris

Student's Department: Nutrition Faculty Mentor: Whelan, Jay

Background: Intimal hyperplasia (IH) in response to injury is regulated by an immune-mediated reaction. Zyflamend (Zyf) is a poly-herbal dietary supplement that has been previously shown to have potent anti-inflammatory properties. Here we examined the effect of Zyf and wholemega (WMega), separately and in combination, on inflammatory-dependent vascular remodeling mechanisms and in the prevention of IH in an animal model of vascular disease. Methods: The diets of aged male rats were supplemented with human equivalent doses of Zyf, WMega, Zyf+WMega, or placebo 7d prior to balloon angioplasty-induced injury of the right carotid artery. Carotid tissue was collected 28d post-injury and stained with trichrome elastin to quantify intima and media areas (I:M) and with isoform-specific antibodies to detect matrix remodeling enzymes and proliferative and inflammatory cell phenotypes. Results: I:M was decreased in Zyf+WMega animals compared to placebo (0.43±0.14 vs. 0.82±0.12, n=9-10, $P<0.05$) while neither Zyf or WMega alone had a significant effect. No supplement group had any effect on matrix remodeling mechanisms or the proliferative phenotype of cells within the injured vessel wall. Macrophage scavenger receptor (MSR) staining revealed M2-type macrophage differentiation was decreased in vessels of Zyf+WMega supplemented animals compared to placebo, while the presence of macrophage/monocyte cell types were not affected (MAC387). Likewise, vimentin/smooth muscle actin (Vim/SMa) co-stain revealed a decrease in myofibroblasts in Zyf+WMega animals compared to all other groups ($P<0.05$). Conclusions: The combination of Zyf+WMega supplementation inhibited IH development while neither Zyf or WMega therapy were independently effective. This occurs independently of vessel wall matrix remodeling and the proliferative mechanisms of disease. While overall monocyte/macrophage vessel infiltration was not affected, Zyf+WMega influenced macrophage differentiation, resulting in decreased M2 macrophages and a reduction in M2-derived myofibroblasts. Ongoing studies are evaluating the downstream attenuation of vessel fibrosis as a possible mechanism for reducing IH.

Poster # 81

Experiences of female high-school head coaches

Kathleen Ann Mcinnis

Student's Department: Kinesiology/Recreat/Sport St Faculty Mentor: Dzikus, Lars

Female coaches are underrepresented in high school sports. This study explores the experiences of female varsity head coaches in one East Tennessee School District, where less than 25% of the head coaches are women. There is a considerable body of work on women coaching in intercollegiate sport, but very little is known about the phenomenon at the high school level. Analyzing existing international research on female coaches at all levels, LaVoi and Dutove (2012) developed an ecological model of barriers and support for female coaches. The current study applies this model to examine experiences of women coaching girls' and boys' sports in high school. We are using a semi-structured interview protocol and thematic analysis to explore the participants' athletic background, coaching careers, work-life balance, life as coach, and gendered experiences with coaches, administrators, athletes, and parents. We also ask them what advice they might have for other women who are considering becoming a coach. UTK IRB granted full approval of the study (UTK IRB-16-03348-XP). At the time of this submission, one pilot interview and two additional interviews have been conducted and transcribed. It is anticipated that data collection will stop after 8-12 interviews or when saturation is reached.

Poster # 82

Prevalence of Adolescents meeting Well-Child and Dental Preventative Care Recommendations in one High School

Ashley Nicole Northcutt

Student's Department: Nutrition Faculty Mentor: Colby, Sarah

Healthy lifestyle choices and regular medical preventative care during adolescence can prevent some diseases and provide early recognition, improve health outcomes, reduce expense, and improve quality-of-life when diseases do

occur. This study examined the prevalence of adolescence meeting preventive care recommendations (well-child and dental visits) and explore relationships between receiving preventive care, demographic factors, and other health behaviors, such as fruit and vegetable (F/V) intake, physical activity (PA), sleep, perceived stress, and weight status. A convenience sample (n = 74) of adolescent participants (ages 14-18 years) at one high school was recruited as part of a larger study (Get Fruved). Participants took an online health survey in Fall 2016. Results indicated that most participants met both well-child and dental recommendations (93% and 73%, respectively). Chi-square analysis and one-way ANOVA were conducted to evaluate factors related to meeting recommendations, and no significant relationships were found. However, participants who reported qualifying for free/reduced lunches were less likely to meet dental recommendations compared to those who did meet recommendations ($p = 0.05$). Further research is needed to understand why dental recommendations are less often met than well-child recommendations and causal factors for not meeting dental recommendations with adolescent populations.

Poster # 83

Soluble epoxide hydrolase inhibitor t-TUCB promotes brown adipogenesis

Brenna Brigid O'Malley

Student's Department: Nutrition Faculty Mentor: Zhao, Ling

Brown adipose tissue (BAT), now found to be present in adult humans, holds great promise in obesity treatment and prevention due to its thermogenic ability to convert energy into heat. Soluble epoxide hydrolase (sEH) hydrolyzes many lipid-signaling molecules into inactive diols, contributing to the regulation of many biological processes. sEH inhibition has been found to be beneficial in chronic inflammatory disorders, including obesity. In this study, we tested the potential effects of a known sEH inhibitor trans-4-{4-[3-(4-trifluoromethoxyphenyl)-ureido] cyclohexyloxy}-benzoic acid (t-TUCB) at various doses on cellular brown adipogenesis using a murine brown cell line. Cytotoxicity of t-TUCB was measured at 24- and 48-hours via MTT assays under proliferation and differentiation conditions, and the effects of t-TUCB on differentiation was assessed by Oil Red O (ORO) stained cell morphology and lipid accumulation. No significant cytotoxicity was found for t-TUCB at all tested doses under differentiation and 24-hour proliferation conditions. t-TUCB showed minimal toxicity under 48-hour proliferation condition at higher concentrations. t-TUCB dose-dependently promoted brown adipocyte differentiation as revealed by ORO-stained adipocyte morphology and lipid accumulation ($p<0.05$). Our findings suggest that t-TUCB may be a promising pharmacological strategy for obesity treatment and prevention by promoting brown adipogenesis.

Poster # 84

Adolescent Choline Supplementation Mitigates the Effects of Adolescent Stress

Abigail Diana Owens

Student's Department: Nutrition Faculty Mentor: Schulz, Kalynn

Stress exposure during development increases risk of mental illnesses such as depression, anxiety, and schizophrenia. Choline is a dietary nutrient important for brain function, and rodent models demonstrate that supplementing the diet of pregnant dams with choline buffers the negative effects of prenatal stress on offspring anxiety and memory function in adulthood. However, it is unknown whether dietary choline supplementation during adolescence buffers the effects of adolescent stress. Therefore, we tested the hypothesis that adolescent choline supplementation mitigates the effects of adolescent stress on working memory using the radial arm maze. If our hypothesis is correct, adolescent stress will impair memory function in stressed animals fed the control diet but not in stressed animals fed the choline-supplemented diet during adolescence. Sprague Dawley rats were exposed to mild, unpredictable stressors 2-3 times per day for 10 days during adolescence. Behavior testing in the radial arm maze began in adulthood. Data collection is currently in progress. If adolescent choline mitigates the effects of adolescent stress, we expect stressed animals fed a choline diet to perform better in the radial arm maze than stressed animals fed a standard diet. Such a result will suggest that adolescent choline intervention effectively mitigates the effects of stress experienced during adolescence. Since choline does not pose a threat to human health, choline may be an option for preventing adulthood stress when administered during adolescence.

Poster # 85

Disruption of Pyruvate Kinase M2 expression in the pancreas affects Î²-cell function

Megan Louise Pence
Student's Department: Nutrition Faculty Mentor: Bettaieb, Ahmed

Type 2 diabetes mellitus is one of the most prevalent metabolic diseases and is characterized by insulin resistance. Over time pancreatic β-cells, which produce and secrete insulin, become non-functional and insulin secretion ceases. Understanding the mechanisms that contribute to glucose-stimulated insulin secretion (GISS) in these cells is important in developing strategies to counteract the progression of the disease. Pyruvate kinase (PK), a rate-limiting enzyme during glycolysis, catalyzes the generation of pyruvate and ATP from phosphoenolpyruvate (PEP) and ADP. In mammals, the M1 isoform, expressed in normal adult cells, and the M2 isoform (a splice variant of M1) is expressed in very specific adult tissues, such as pancreatic β-islets. The function of PKM2 in pancreatic β-islets remains to be determined. To dissect the metabolic functions of PKM2, we used islets from wild type and pancreas-specific PKM2 knockout (KO) mice and examined how PKM2 deletion impacted insulin secretion. Notably, PKM2 deficiency enhanced GSIS in islets isolated from PKM2 KO mice. These data suggest that PKM2 is a regulator of insulin secretion and may potentially regulate systemic glucose homeostasis. In summary, our findings identify a role for PKM2 in the pancreatic β-cells and identify it as a potential therapeutic target in treating diabetes.

Poster # 86

Sources of Error in Wearable Step Counters

Whitney Lynn Pittman Damla Sarisaltik
Student's Department: Kinesiology/Recreat/Sport St Faculty Mentor: Bassett Jr, David

Introduction: Activity trackers are a common assessment tool for physical activity across research, clinical, and personal domains. Step counts are important because they are strongly related to health; however, validity across devices must be assessed. Purpose: To determine sources of error in the step counting utility of ten activity monitors across different types of physical activity. Methods: Participants (n=21; 26 ± 9 yrs) wore ten activity monitors. Four devices were worn on the non-dominant wrist (Garmin Vivofit 2, Fitbit Charge, Withings Pulse Ox, and ActiGraph GT3X+), four on the hip (Yamax Digi-walker SW-200, Fitbit Zip, Omron HJ-322U, ActiGraph GT3X+), and two on the right ankle (Stepwatch with modified and default settings). Participants completed 15 activities for 2 min each. Hand count was used as the criterion. Statistical equivalence was determined by equivalence testing, and error was quantified by mean absolute percent error (MAPE). Results: Ranges for MAPE: activities of daily living 46.2%-250.3%, treadmill ambulation 1.2%-47.1%, over-ground walking 6.4%-48.8%. Conclusion: The StepWatch (modified settings) was the only statistically equivalent device across all activities. During treadmill ambulation and over-ground walking, most devices performed well, but in activities of daily living, wrist-worn devices tended to over-count, and hip-worn devices tended to under-count steps.

Poster # 87

How Colonocyte Metabolism Shifts in Colorectal Cancer

Haley Noel Porter
Student's Department: Nutrition Faculty Mentor: Donohoe, Dallas

Dietary fiber has been proposed to protect against colorectal cancer. Butyrate, a fiber metabolite that is produced by bacteria in the colon is known to inhibit cell proliferation and promote cell differentiation, while also inducing apoptotic cell death in colorectal cancer cells at physiologically relevant concentrations. Unlike the majority of cells in the human body that prefer utilizing glucose, colonocytes use butyrate as the primary energy source. However, colorectal cancer cells shift away from utilizing butyrate towards glucose (the Warburg effect) leading to the accumulation of butyrate in the nucleus. Once in the nucleus, butyrate can act as an inhibitor of histone deacetylases to decrease proliferation and promote apoptosis. Here, we sought to determine how the oxidation of butyrate is impacted by knocking down pyruvate kinase M2 (PKM2), a key enzyme in glycolysis necessary for tumor growth, in colorectal cancer cells. In this study, we used a lentivirus approach to knockdown PKM2 in HCT116 colorectal cancer cells, and the efficiency of knockdown was confirmed by western blot. Butyrate oxidation was then accessed using an XF24 Analyzer, which measures oxygen consumption in real time. We found that PKM2 knocked down cells exhibit an increase in

butyrate oxidation. Additionally, PKM2 deficiency altered butyrate's ability to slow cell proliferation. These data suggest the perturbation of pyruvate kinase isozyme M2 in colorectal cancer cells may shift metabolism towards butyrate oxidation and away from the Warburg Effect. This is clinically important to understand the potential of dietary fiber in cancer treatment and prevention.

Poster # 88

Improved glycemic control in mice with specific deletion of Pyruvate kinase M2 in the pancreas

Dexter Lee Puckett

Student's Department: Nutrition Faculty Mentor: Bettaieb, Ahmed

Pyruvate kinase (PK) regulates the final rate-limiting step of glycolysis and catalyzes the dephosphorylation of phosphoenolpyruvate (PEP) to pyruvate and the production of ATP. In Human, the M2 isoform (PKM2) is expressed in tumor cells and has emerged as an attractive target for cancer therapy. PKM2 is also expressed in some differentiated tissues, such as the insulin secreting pancreatic beta cells, but the role of PKM2 in these cells remain poorly characterized. To investigate the metabolic functions of pancreatic PKM2, we generated mice with pancreas specific PKM2 deletion. Mice were fed regular chow or high fat diet and metabolic parameters, insulin secretion and glucose tolerance were determined. On a regular chow, PKM2 KO and control mice exhibited comparable glucose tolerance and insulin sensitivity. However, high fat feeding promoted earlier improvement of insulin sensitivity and glucose tolerance in PKM2 KO mice. Additionally, PKM2 KO mice exhibited improved glucose-stimulated insulin secretion. In summary, these studies identify a novel role for PKM2 in pancreatic endocrine function and suggest that targeting PKM2 function in vivo may be of potential use in management of diabetes.

Poster # 89

2DG Decreases Butyrate's Ability to Function as an HDAC Inhibitor in Colon Cancer Cells

Beverly M Samples

Student's Department: Nutrition Faculty Mentor: Donohoe, Dallas

Consumption of a high-fiber diet is postulated to protect against colorectal cancer, although the mechanism(s) that contribute this effect are not fully understood. In the colon, fiber is fermented into short-chain fatty acids (SCFAs). Butyrate is one of these SCFAs and has been shown to be an energy source for healthy colon cells while being lethal to colon cancer cells. Previous work has demonstrated an important role for glucose utilization in regulating butyrate's anti-cancer effect, and may indicate why cancer cells, which have elevated glucose requirements, are uniquely sensitive. Here, we studied the effects of glucose utilization in colorectal cancer cells on butyrate's function as an HDAC inhibitor. We used 2-deoxyglucose (2DG) to block glucose utilization to test how butyrate's ability to function as an HDAC inhibitor would be impacted. When 2DG was added to butyrate-treated cells, there was a decrease in histone acetylation compared to cells without 2DG. This suggests that the addition of 2DG caused cells to use butyrate as an energy source when glucose was not available, so butyrate's ability to function as an HDAC inhibitor was decreased. These data allude to an interdependence between butyrate's role as an HDAC inhibitor and as an energy source.

Poster # 90

Towards Adapting Flexible Nonlinear Periodization for Untrained Adults: Exploring Perceptions of Aerobic Exercise Demand

Ethan Schaltegger

Student's Department: Kinesiology/Recreat/Sport St Faculty Mentor: Strohacker, Kelley

Background. Flexible Nonlinear Periodization (FNLP) is a method of organizing sport-specific resistance training, where workload demand is determined by the acute physical and mental state of the trainee. Applying this participant-responsive approach may help inactive adults maintain adequate aerobic exercise volume for health benefits. As a first step towards adapting FNLP to meet this need, it is important to examine how adults conceptualize aerobic demand (e.g. based on time, intensity, or both). Purpose. The purpose of this exploratory study is to determine how adults (sampled from the general population) perceive the demand of various aerobic bouts. Methods. Qualtrics was used to build and distribute surveys. Respondents were asked to rank order 12 aerobic bouts based on perceived demand and to provide open-ended responses describing what aspects contribute towards the demand of a given bout. Repeated

measures analysis of variance (ANOVA) of ranking data will be used to determine perceived distinctness of bouts. Principal component analysis and k-mean cluster analysis will be used to identify relevant ranking patterns. Descriptive analyses will be used to assess potential demographic differences within these classifications. Open-ended comments will be assessed qualitatively using conventional content analysis procedures. Results. All data are collected and results are pending.

Poster # 91

Using an Online Survey Distribution Platform to Conduct Ecological Momentary Assessment of Exercise Antecedents: A Feasibility Study

Lucas Forrest Sheridan

Student's Department: Statistics Faculty Mentor: Strohacker, Kelley

Ecological Momentary Assessment (EMA) allows input of affective, social, and behavioral factors by participants (PPTs) in real time, which reduces recall bias. While such data may help predict exercise behavior, one limitation is the need for additional devices (palm pilot). Qualtrics is an online survey distribution platform compatible with personal smartphones. The feasibility of using Qualtrics to conduct EMA of exercise behavior in free-living adults is unclear. PURPOSE. Test feasibility of using Qualtrics to conduct EMA via text message. METHODS. Across 14 days, texts with a survey link were distributed at 9:30am, 1:30pm, 5:30pm, and 9:30pm. The survey assessed hypothesized antecedents of exercise and allowed PPTs to log exercise behaviors. Feasibility outcomes were assessed using R programming language. RESULTS. From 6/13/16 to 10/26/16 recruitment yielded 29 (55% women, 24±6 years) PPTs. Out of 1624 prompts sent, 83.1% of the surveys were in compliance with research guidelines (i.e. completed within 60-min of receipt). On average it took 5.07±8.65-min to finish the surveys once they were started, with the average survey completed within 16.56±15.04-min from the time it was sent. DISCUSSION. Using Qualtrics for EMA has potential to minimize PPT burden. Further feasibility testing in the general adult population is warranted.

Poster # 92

A Deficiency in Pyruvate Kinase M2 Has Anti-Obesity Implications Through Making White Adipocytes Look and Behave Like Brown Adipocytes

Cynthia Michele Standifer

Student's Department: Nutrition Faculty Mentor: Bettaieb, Ahmed

Obesity is a growing epidemic that presents a major health problem worldwide. The past decade has seen advances in the identification of specific factors that contribute to this condition. However, despite these strides, there is still much to be learned about the underlying mechanisms. A better understanding of these biochemical mechanisms will enhance our ability to prevent and treat obesity. The conversion of white adipocytes that store fat into brown adipocytes, which burn fat, represents an anti-obesity therapeutic strategy. This study demonstrates that knockdown of pyruvate kinase M2 (PKM2) changes white adipocytes into behaving like brown adipocytes. PKM2 is an enzyme that functions in glycolysis to catalyze the transfer of a phosphate from phosphoenolpyruvate to ADP resulting in the formation of pyruvate and ATP. The role of PKM2 in adipocytes is unexplored. In the present study, we focused on investigating the impact of PKM2 on white adipocyte cell fate or differentiation. We demonstrate that PKM2 is indeed expressed in both brown and white adipocytes. shRNA-mediated depletion of PKM2 in white adipocytes promotes the development of a brown fat-like thermogenic program. These novel findings demonstrate that PKM2 suppression in white adipocytes could constitute a potential strategy to prevent obesity.

College of Nursing

Poster # 119

Assessing the impact of animal-assisted interventions on patients in the clinical setting

Emeri Kaitlin Allan
Student's Department: Nursing Faculty Mentor: Elliott, Lizanne Munson

The human-animal bond is a mutually-beneficial relationship in which humans and certain animals participate. Health, previously regarded as the absence of disease, encompasses every aspect of human life including physical, social, and mental prosperity. To address holistic wellness, it is necessary to investigate the psychosocial effects animals have on people, specifically clinical settings where individuals experience declines in physical health. A systemic review of literature was conducted by keyword searching Pubmed and CINAHL Complete databases; fifteen references were retrieved and synthesized concerning animal-assisted interventions in clinical settings. Researchers have demonstrated that a beneficial relationship exists between animal-assisted interventions and biophysiologic outcome measures among patients of various ages with a wide range of illnesses. Several scientific gaps in the science exist; one such gap pertains to the lack of data on canine-assisted activity in the trauma setting. The purpose of this presentation will be to articulate the state of the science on animal-assisted interventions in the clinical setting as the foundation for a pilot project using a randomized control trial of a canine intervention in the inpatient trauma clinical setting. Data gained from this study may help improve psychosocial and physical outcomes among trauma victims.

Poster # 120

Compliance with Personal Protective Equipment

Sloan Taylor Bennett, Robert Darold Land, Isabel Elise Cartwright, Elizabeth Alice Jenner
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Problem statement and background: Decreased compliance with personal protective equipment (PPE) among healthcare professionals could be negatively impacting patient care and safety. Purpose and research questions: The purpose of this project is to examine current procedures to ensure PPE adherence among healthcare providers and determine if and where the compliance issues lie. Additionally, the goal of this project is to suggest alternatives to the current practices. Review of Literature: This section provided information on current practices regarding PPE practice, if these current practices are not effective, and possible solutions to change the practice. -Current practices in clinical setting: An inappropriate use of PPE has been observed in the clinical setting. The importance that hospitals give to proper PPE use is shown by a UT Medical Center PPE policy. -Possible reasons current practices are ineffective: Current practices with healthcare professionals on PPE adherence seems to be inadequate as shown in research studies due to knowledge deficit, lack of PPE supplies, and acceptability of PPE usage among co-workers. -Possible solutions: Through this ROL, possible solutions have been evaluated in the hopes to improving compliance such as through the use of Microsoft Kinect surveillance system, improving healthcare worker education, and implementing audits to check adherence. Conclusions—Recommendations for practice: More research needs to be conducted to determine if PPE use among healthcare workers is an issue, and if so, what are the causes of the poor compliance rate.

Poster # 121

Self-care strategies for nurses: Relaxation and meditation techniques for stress reduction and the prevention of burnout

Lauren Taylor Bolek, Lauren Marie Lovell, Su Mei Chin, Sara Church
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

There have been many studies that explore the high prevalence of burnout and compassion fatigue in nurses. Burnout has been documented to have detrimental impacts on nurses, patients, and healthcare organizations. Many burnout interventions have been shown to improve the physical and mental health of nurses, patient satisfaction, and decrease associated costs of burnout. The purpose of this project is to evaluate the use of meditation and relaxation techniques as interventions that assist nurses in the prevention of stress and burnout. The overall goal of this project is to determine whether specific recommendations for practice can be made or if additional research is needed.

Poster # 122

Comparing Policy to Best Practice: Family Presence During Resuscitation

Sarah Elizabeth Boop, Alison Veronique Dawant, Leslie Elaine Watts, Taylor Harris
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem Statement and Background: In 2016, there were nearly 210,000 in-hospital cardiac arrests in the United States. A large body of literature has explored the effects of family presence during cardiopulmonary resuscitation (FPDR) on the family members, the care providers, and the patient, with the majority of the research supporting FPDR. In light of the benefits of FPDR noted in the literature, many healthcare organizations have drafted policies to address FPDR, including the University of Tennessee Medical Center in Knoxville, TN. Purpose: The purpose of this paper is to compare best practices and hospital policy guidelines to UTMC's FPDR policy and to develop specific nursing practice recommendations to supplement UT's policy. Methods: A review of FPDR literature was performed using PubMed and Google Scholar. Terms searched included "family presence," "FPDR," "resuscitation," "CPR," "best practice," "policy," "current practice," "staff," "caregiver," "nurse," and "nursing." Studies were grouped into the following categories: effects of FPDR on all present, FPDR policy recommendations, and specific nursing recommendations. Results: To be determined. Conclusion: To be determined.

Poster # 123

Factors Contributing to Sudden Infant Death Syndrome

Marlisa Linda Brasfield, Lindsay Marie Ammerman
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Problem Statement and Background: SIDS is the number on killer of infants between one and twelve months. It is remarkably more prevalent in the US compared to other developed nations. Recently, the rate of SIDS has begun to climb again so there needs to be education and awareness on steps to be taken for prevention. Purpose and Research Question: The purpose of this project was to evaluate the causative factors of sudden infant death syndrome (SIDS) and the current recommended precautions to make a comprehensive list of recommendations. What is the more effective/safe sleep positon and environment for baby? What are the modifiable risk factors that increase the risk of SIDS in prenatal and post-partum care? Review of Literature: We analyzed preventative measures that can be taken in prenatal care, postnatal care, and during infant sleep. We evaluated 14 research articles to develop a list of comprehensive recommendations for pregnant women, health care providers, and infant caregivers. Our findings showed that prevention of SIDS begins with pregnant women abstaining from alcohol, tobacco and opioid use. Once baby is born, prevention continues in the hospital. Caregivers are more likely to mimic sleeping precautions taken by the nurse in the hospital so best practice needs to be demonstrated. Continuing to abstain from smoking after birth and breastfeeding show a positive correlation in prevention of SIDS. When baby is sleeping he or she should be in a crib alone on his or her back with a firm mattress with nothing but a rubber pad or fitted sheet. Blankets, stuffed animals, padded bed rails, and loose clothing have been contributing factors in suffocation and strangulation resulting in SIDS. Pacifiers during infant sleep has been shown to be a positive impact preventing SIDS. Co-sleeping is also a risk factor for SIDS due to the fact that it can overheat the baby or put baby at risk for suffocation or falls if caregiver falls asleep. Conclusions-Recommendations for Practice: Following recommendations for the prevention of SIDS are as follows: abstain from tobacco, alcohol, and opioid use when pregnant. After baby is born, breastfeed if possible, and have baby sleep alone in crib.

Poster # 124

CPR TRAINING METHOD REVIEW

Tanya Bueter, Brady Scott Brown, Gabriel Reed Archer, Sallie Jean Ware
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Introduction: Over 380,000 people experience cardiac arrest in the United States each year. Cardiopulmonary resuscitation (CPR) skills are the main intervention and response to cardiac arrest. Despite mandatory CPR certification requirements in most modern healthcare settings, there is often lack of focus on developing and retaining the skills

necessary to successfully deliver high-quality compressions. The majority of healthcare workers are instructed and skill tested one time in two years but survival rates to hospital discharge from sudden cardiac arrest remain only around 18-20%. The purpose of this review is to examine different models of CPR training on healthcare providers' overall retention of skill and ability to carry out high-quality, effective resuscitation in real-world practice. This review will explore the confidence and competence of healthcare workers, in addition to different approaches that impact the quality of life-saving skills during CPR. Literature Search Strategies: PubMed was used in the search for articles. The key terms used were "CPR", "resuscitation", "retention", "outcomes", "feedback", "technology", "frequency" as well as multiple combinations of those terms. Currently, we have examined 5 research articles but have 16 articles compiled that we have yet to scrutinize to see if they meet our inclusive and exclusive criteria. Our exclusion criteria are articles that are older than 10 years old, were not written in English, and did not involve an adult patient population. Literature Review Discussions of Literature: To be determined. Conclusion:To be determined.

Poster # 125

The voices of photos: Transition to adulthood in lower income emerging adults with Type I Diabetes Mellitus

Michael J Curtis

Student's Department: Nursing Faculty Mentor: Abdoli, Samereh

Emerging adulthood (18-30 years old) is a vital, constructive period presented by exploration, experimentation, and risk-taking (1). Emerging adults with Type 1 Diabetes Mellitus (T1DM) face unique challenges managing their illness due to the additional daily demands of diabetes care and navigating the life transitions of adulthood (2). Diabetes management can be more challenging for low-income emerging adults with T1DM living in Appalachia, an underserved area. This can place them at an increased risk for poor glycemic control, emergence of chronic diabetes complications, and premature mortality (3- 4). However, there is a lack of science particularly about the experience of low-income emerging Appalachian adults with T1DM during transition to adulthood. Understanding the experience of this marginalized population will inform future empowerment interventions. This study will use photovoice, an innovative qualitative and participatory research (5) to explore the challenges of lower income emerging adults with T1DM during transition to adulthood. Photovoice this study will entail putting camera in the hands of low-income emerging adults with T1DM in Appalachian Tennessee, and asking them to visually present their challenges in diabetes management during transition to adulthood. It may help health care providers appreciate an emerging adult's personal experience about their transition to adulthood.

Poster # 126

Safe Patient Handling to Prevent Nurse Injury

Anne-Katherine K Darroch, Brenna Hope Mcmackin, Kaitlyn Jolie Hillstead

Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem: One issue that nurses face is the prevalence of musculoskeletal injuries related to patient transfer and repositioning. Background: Manual transferring and repositioning of patients by nurses increases the risk for injury. There is a variety of literature available that evaluates different interventions to decrease the incidence of injury. Purpose: This evidence-based project aims to look at the cause and effect of musculoskeletal injuries in the nursing field, as well as interventions to prevent these types of injuries from occurring. Research Questions: What are some of the results and implications of these nurse injuries? What are some effective interventions in preventing nurse musculoskeletal injury related to transferring and repositioning patients? Review of Literature: The articles that were examined all supported the idea that musculoskeletal injury impact nurses' ability to work as well as their physical and mental health, and two methods to reduce these injuries include mechanical lifts and slide sheets.

Poster # 127

Effectiveness of Current Interventions on Preventing Hospital Acquired Pressure Ulcers (HAPUs)

Rhian Victoria Dougherty, Hannah E Raines, Katherine Claire Vance
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem statement and background: The occurrence of hospital acquired pressure ulcers (HAPUs) has shown a steady rise in recent years. As a result of this increase, patient safety and medical expenses have been effected. Many interventions have been implemented in order to decrease the occurrence of HAPUs; the current interventions include turning and repositioning at least every two hours, maximizing mobilization as tolerated, protecting heels and bony prominences with foam dressings, managing and monitoring nutrition, keeping the patient dry, and elevating head of bed no more than 30 degrees, unless contraindicated for patients at high risk. Purpose and research questions: Throughout this research, prevention mechanisms are reviewed in order to determine their effectiveness and relevance. This research also serves to determine if the implementation of new interventions should be put into place or if current practices should be modified. The questions addressed include: Do the current interventions effectively reduce the risk of HAPUs? Do more interventions need to be implemented in order to reduce HAPUs? Review of Literature: The articles reviewed focus on the use of current interventions in conjunction with new interventions. The new interventions discussed include the use of specialty beds, patient repositioning, preventative dressings, using zinc free barrier cream, and turning 30 degrees every two hours. Conclusions: From these interventions, the two most reliable and effective interventions include preventative dressings and repositioning the patient by 30 degrees every two hours. The nurse manager will be in charge of implementing these new policies in the clinical setting to help decrease the incidence of hospital acquired pressure ulcers.

Poster # 128

Catheter Associated Urinary Tract Infection Prevention

Dylan Martin Foster, Corey Thomas Kocisko, Dylan Martin Foster, Heather A Mackenzie
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Problem: Catheter Associated Urinary Tract Infections (CAUTI) is one of the most common infections acquired in hospitals and can cause problems not only for the health care worker, but also for the patient. Catheters are highly used and are commonly associated with urinary tract infection. Hospitals are not reimbursed if these infections are shown to be contracted in the hospital. These infections are all too common and can have devastating effects on the populations who are vulnerable to them. Purpose: The purpose of this research project is to pinpoint a solution for the occurrence rates of catheter associated urinary tract infections by exploring the most pertinent literature on the topic. Research Questions: What are the results of studies on CAUTI? What guidelines and policies are working best? What guidelines and policies are not working well? Review of literature: The sources we reviewed focused on the key points: only use catheters when necessary, keep a closed drainage system, remove as soon as possible, and so on. The CDC emphasized these points for hospitals to make their own guidelines. The studies also stressed these points, but made additional recommendations. Two current hospital policies were also compared to our other findings. Conclusion: We determined the hospital policies we reviewed have points that work well and nothing should be removed. However, we believe additional points should be added. We conclude that new grad education and check offs helped to reinforce CAUTI prevention. Continued education may also help to decrease CAUTI. Finally, using two people during the catheter insertion process will decrease infection rates.

Poster # 129

Alarm Fatigue: Methods to Decrease to Improve Patient Safety

Maraya Hope Futcher, Sadie Amelia Lett, Lucia Louise Chalmers, Lauren Elizabeth Love
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem Statement and Background: Alarm fatigue has become a growing issue in the clinical setting affecting patient safety. Alarms are meant to indicate key physiological changes in a patient's status. However, current literature shows increasing problems with excessive alarms leading to alarm fatigue with the concern of more life-threatening events being overlooked due to the excessive noise. Purpose and Research Questions: The purpose of this research

project was to identify effective methods to implement within the hospital to reduce unnecessary alarms and ensure safe patient care. What are the most effective methods and practices to reduce alarm fatigue? Can these methods be implemented on all patient care units within the hospital? Review of Literature: The research analyzed included 11 articles on reducing alarm fatigue. A variety of methods are being researched in order to reduce the rising problem of alarm fatigue. Most of the research has been conducted in critical care units, making it difficult to generalize the findings to all hospital patient care settings. Recommendations for Practice: In this project, the current literature on the subject of alarm fatigue was summarized and synthesized. Effective methods for reducing alarm fatigue within the research included monitor system modifications to reduce alarm frequency, education, and implementation of algorithms.

Poster # 130

The Effects of Transformational Leadership by Nurse Managers on Nurse Turnover

Julia E Garland, Haleigh Caitlyn Meyer, Antasia Brianna Burrow

Student's Department: Nursing Faculty Mentor: Swift, Shelia

Introduction: Nurse turnover has become a large issue within the healthcare community impacting patient satisfaction, nurse to patient ratios, and hospital costs. Turnover is affected by many factors, including the leadership style of nurse managers. The purpose of this paper is to review the current research regarding the effect of transformational leadership by nurse managers on job satisfaction and ultimately turnover of staff nurses. Review of Literature: Evaluation of several leadership styles has shown that the relational styles are superior to transactional styles. Transformational leadership has been reported at the preferred leadership style of nurse managers due to its personable traits and opportunity to learn from mistakes. Patient satisfaction also was shown to improve with transformational leadership. Transformational leadership is associated with nurse autonomy, which increases job satisfaction. When nurses are satisfied with their jobs, their stated intent to leave decreases. However, further research is needed on larger sample sizes that factor for other things that impact nurse turnover – pay and patient to nurse ratios.

Poster # 131

The effectiveness of the sterile cockpit method in mitigating medication areas in the hospital

Rachel Lynne Garson, Natalie Adiam Walker, Elisabeth Anne Pitt, Evelyn Kouzov

Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Nurses are typically distracted during medication administration and verification, causing them to lose focus and consequently putting the patient's safety at risk. Recent literature has shown that the use of the cockpit method may reduce medication error. The cockpit method is defined as a regulation requiring employees to refrain from nonessential activities during critical phases of work. The purpose of this literature review is to evaluate the use of the cockpit therapy on the amount of medication errors experienced. This is a systematic critical literature review. The paper will document the impact of distractions on medication administration, as well as the effectiveness of cockpit therapy to reduce these mistakes. The effectiveness of the cockpit therapy is to be determined. These findings may be generalized to prevent further distraction related medication errors.

Poster # 132

The Effects of Fatigue on Nurses and Patient Care

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Student's Department: Nursing Faculty Mentor: Brown , Kimberly

Problem Statement and Background: Burnout rates in the nursing profession have continued to grow along with the increased demand for nurses in the medical field. Stress and fatigue could induce burnout, which is a psychological response to feelings of incompetence, depersonalization, and emotional distress. The fatigue nurses experience may stem from consecutive shifts and length of shifts, and it is plausible that these contribute to burnout. Purpose and Research Questions: The purpose of this project is to examine burnout rates among nurses as related to the effects of fatigue on both the nurse's health and patient care. Issues affecting burnout rates in nurses have caused the question to arise: For nurses who work in a hospital setting (P), does scheduling consecutive 12 hour shifts (I) lead to fatigue, increasing the risk of patient errors and contributing to burnout (O)? Review of Literature: Burnout is influenced by 12

hour shifts that increase fatigue that could lead to this less than favorable outcome. This paper systematically reviews 10 peer-reviewed studies to review their literature and propose an intervention. The articles cover implications on nurses' health, patient safety, and interventions to improve this problem. There is also a relationship between burnout and reduced performance. Conclusions: There have been studies that lay the foundation for the resolution of fatigue in a 12 hour shift, and they highlight the path to testing specific interventions. In order to draw inferences more research needs to be conducted on consecutive 12 hour shifts and their effects on fatigue and ultimately burnout. Conducting this research could decrease the harm felt by both the nurse and the patient that stems from nursing fatigue and, ultimately, leads to nurse burnout.

Poster # 133

Predictive Risk Assessment Model for 30-Day Readmissions Among Heart Failure Patients in Southeast Appalachia

Matthew Johann Grimm

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There are many specific contributing factors to 30-day hospital readmissions among heart failure patients. In such, many generalized predictive risk assessment models that have been created in response to the financial cost of hospital readmissions over look these factors. These contribute to skewed results when used for the specific patient population of those with heart failure. Therefor, a growing need for focused risk assessment models that accurately represent heart failure patients, especially in Southeast Appalachia, has been seen. This research examines known contributing factors of 30-day readmissions among heart failure patients and compares them to the variables used in preexisting predictive models in an effort to determine the reliably of said models based on its representation of, or lack there of, known contributing factors. The purpose of this research study is to create a predictive readmission risk assessment model for heart failure patients. This model would calculate a readmission risk score based on known causes of 30-day readmissions, such as demographics, co-morbidities, hospitalization, mental health, and compliance. The goal is that high-risk patients can be identified prior to discharge in order to allow for healthcare provider intervention aimed at educating patients about strategies to prevent readmissions within 30 days.

Poster # 134

The Psychosocial Responses to and Decision Making Strategies of Hereditary Cancer Genetic Panel Testing

Gillian P Harris

Student's Department: Nursing Faculty Mentor: Hutson, Sadie

Cancer genetic testing (CGT) is a powerful diagnostic test that improves prevention and early detection of individuals at high genetic risk of cancer. Since the completion of the mapping of the Human Genome Project, CGT has become increasingly accessible in the clinical setting. However, as gene discovery and sequencing technology improves, the impact of these advancements on patients is less understood. The use of multi-gene cancer gene panel tests has become increasingly more prevalent; as such, the likelihood of incidental or inconclusive findings has increased. This can cause confusion among patients. The author conducted a literature review to outline the science on cancer genetic testing methods, the psychosocial responses to testing among patients, and the unique role of nurses in this process. Forty-six references were identified via PubMed and CINAHL databases using the keywords "genetic testing," "panel testing," "genetic counseling," "psychosocial oncology," and "women." A significant gap in the literature exists regarding multi-gene cancer genetic panel tests and the associated experiences and decision-making processes among individuals who have had testing. Future research will specifically explore the experiences of young women with breast cancer who have undergone hereditary cancer risk assessment genetic panel testing that reveals incidental or inconclusive findings.

Poster # 135

Nursing Bereavement Interventions

Kassandra Leigh Hermanson, Taylor Renee Neuharth, Jenna Marie Duerst
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

The death of patients is a particularly prominent and relevant issue that health care professionals are forced to face. Bereavement programs designed in a nursing framework are lacking in substance and evidence. The emotional and physical needs of nurses needs to be taken into consideration because how they deal with bereavement could potentially lead to premature burn out, depression, or harm. Due to previous studies and their lack of success with single interventions, it would be advantageous to determine if using more than one strategy simultaneously is beneficial. As a result of the variation from one person to the next, it is crucial that there are multiple solutions to help nurses work through their grief and bereavement after suffering the loss of a patient. This purpose of the study is to investigate if combining multiple interventions, including support groups, journaling, or using sick leave, would provide more adequate measures of coping and prevent premature burnout of nurses struggling with the negative consequences of loss of their acute and long-term patients. The results of using multiple interventions simultaneously has yet to be determined.

Poster # 136

The Use of Meditation and Mindfulness-Based Stress Reduction Programs in Nurses

Hannah Ramsey Holcomb, Darian Andrea Frieson, Darielle R McDonald, Jordan Ann Wilson
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem statement and background: Stress is a feeling that many nurses experience during their career. Stress could affect the physiological and psychological well-being of the nurse in the workplace, which could potentially compromise patient safety. Non-pharmacological treatments, such as mindfulness and meditation, can aid in stress reduction without compromising the health of the nurse. Purpose and research question: The purpose of this project is to analyze and report current literature regarding the effectiveness of mindfulness based stress reduction (MBSR) programs and meditation to reduce stress in nurses. The research question proposed is: In the nursing population, how effective is mindfulness and meditation at reducing stress? If meditation and MBSR are found to be effective, there should be a reduction in stress levels of nurses. Review of Literature: The evidence in the literature indicates that MBSR programs and meditation were effective in decreasing stress and burnout in nurses. Conclusions- Recommendations for practice: The MBSR programs and meditation has shown to be effective in decreasing stress levels in nurses. Based on the literature reviews, we recommend future studies to utilize adequate sample sizes and more longitudinal studies along with the development of their study using only randomized controlled trials. We also recommend implementing MBSR or a variation of the program into the nurse's workplace.

Poster # 137

Kangaroo Care and the Effect on Mother-Baby Bonding

Marielle Lynn Holtzclaw, Caroline Elizabeth Macrae, Brianna Kaitlyn Pike, Carly Joanne Ross
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem Statement and Background: Premature birth is a major health problem correlated with an interrupted mother-baby bonding experience, alongside unfavorable health conditions of the mother and baby individually. These premature infants are in the neonatal intensive care unit (NICU) for months at a time, making it difficult for the mother-infant bonding. Kangaroo Care (KC) is the use of skin-to-skin contact, providing an opportunity for bonding between the mother and infant. Purpose and Research Questions: The purpose of this paper is to discuss the role of KC and its benefits to premature infants and mothers. Questions that are answered in this paper include: Does KC increase mother-infant bonding? Does KC regulate temperature, increase feeding time and growth rates, and decrease infant mortality? Does KC increase confidence in the mother's ability to provide care? Does KC decrease the rate of postpartum depression and guilt from preterm birth in the mother? Review of Literature: Research was performed through the observation and evaluation of mothers' relationships with their premature newborn using KC. Evaluations were

performed using questionnaires, interviews and check-ups. KC improved bonding of the mother and the baby. KC not only showed health benefits for the newborn, but also benefited the mother's mental and physical health. Conclusion: As shown in the research, KC was shown to benefit the health of the premature infant, as well as the mother. The results suggest that KC should be implemented in the NICU with healthy premature infants. Nurses should inform and guide parents on making the decision to perform KC on their newborn. Recommendations for further research include performing studies on the long-term effects of this care. Key Words: kangaroo care, mother-infant bonding, premature infants, preterm birth, skin-skin contact, Neonatal Intensive Care Unit

Poster # 138

Evaluating Effectiveness of Different Distraction Techniques Among Pediatric Patients

Halli Koger, Hannah Chistenson, Ellen Christine Dailey

Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Introduction: Invasive procedures such as venipuncture, blood draws, or laceration repairs can be terrifying and distressing to young children leading to negative pain perception and possibly interfere with the success of the procedure. This problem can be addressed by the use of distraction techniques on pediatric patients undergoing invasive procedures. The use of distraction during these procedures exemplifies atraumatic care. Literature Review: The effects of five different types of distraction techniques; audiovisual, music therapy, toys/pressing ball/Flippits, soap bubble therapy, and parental distraction/holding, were evaluated for effectiveness in decreasing levels of pain and distress in children undergoing invasive procedures. Each distraction technique is assessed based on, at least, two articles out of the eleven found. Results of the research indicated that each method was effective in decreasing children's perception of pain during and after the procedure. Furthermore, the research studies showed a decrease in general distress and fear or anxiety felt during and after the procedures. Conclusions and Recommendations: The collective results indicate that it is not the actual procedure that is painful to children undergoing invasive procedures, but instead the anticipation of the invasive procedure and the fear of pain that breeds anxiety which increases pain perception. According to the literature, any of these five distraction methods may be effective in easing pain and anxiety levels in children undergoing venipuncture. A distraction method can be chosen based on the age of the child, the presence or absence of a parent, available staff, and monetary resources.

Poster # 139

The Meaning of Access to Care for Persons with a Low Family Income: A Phenomenological Approach.

Malerie R Lazar

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Low family income presents a wide variety of problems for men and women seeking access to health care. Health care disparities among persons with a low family income (PLFI) continues to be one of the most complex and prevalent problems, particularly for rural America. Many barriers exist for PLFI who seek access to adequate health care in the United States (U.S.). A review of literature revealed common barriers to primary care to be a lack of education, complications with health insurance, and personal distrust of health care providers. Acknowledging the substantial barriers that prevent access to routine health care for PLFI is the first step towards determining future sustainable solutions. A gap in the literature indicates the voice of low-income persons and the meaning of access to care for them is unheard. Future research will examine the meaning of access to care to PLFI in order to provide insight to how healthcare providers can effectively assist those who are in need. A phenomenological approach will be used to explore the essence of the experience and meaning of access to care for those who receive services of non-profit medical organization clinics (such as Remote Area Medical Clinic), which becomes a typical source of care for low-income persons.

Poster # 140

Transmission of Infection associated with Healthcare Providers' Stethoscopes

Amanda Leigh Letsinger, Madalyn Leigh Burke, Jessie Lynn O'Rear, Rachel Lauren Newton
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Introduction: Stethoscopes are used on patients numerous times a day, and the reuse of them between patient visits without proper cleansing has led to an increased incidence of infection transmission. Although stethoscopes come into contact with patients just as much as healthcare providers' hands, stethoscope cleaning is much less emphasized. The noncompliance to current policies and lack of awareness has had a negative impact on patient outcomes. The CDC reported around 1.7 million hospital-acquired infections (HAIs) in a given year. The purpose of this project is to identify the issue of increased infection transmission when stethoscopes are not properly cleaned between each patient and to focus on proposing a policy that will reduce HAIs. Literature: HAIs are a huge threat to patient safety. Studies have identified that the contamination of stethoscopes can lead to resistant strains of bacteria, putting patients further at risk for disease and extended hospital stay. Other studies disclosed that certain healthcare providers were unaware that they needed to clean their stethoscopes or that they failed to do so on a regular basis. Current best practice recommended by the CDC is using an alcohol prep pad between patient uses to reduce the rate of HAIs. Conclusions: Based on this data, the recommendation is that healthcare providers need to be educated on the risk for contamination due to stethoscopes and understand the importance of following an approved policy. The policy promoted by the CDC has been shown to be effective, but adherence to the policy seems to be the issue. Whether the solution be stricter compliance to the policy or implementing alternative methods to clean the stethoscope, it is essential for providers to acknowledge this issue and adhere to best practice in order to better protect and serve their patients.

Poster # 141

The Use of Music Therapy to Decrease the Agitation of Patients with Dementia

Chelsea Alia Lewis, Sydney Macey Incorvaia, Hannah Elizabeth Cassetty, Emily Kathleen McHugh
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem statement and background: Dementia is a global phenomenon that takes a toll effect on both the victim of the illness and the caregivers of the patient. Dementia has no current cure, and pharmacological interventions used to combat behavioral issues secondary to this disease can cause additional harm to the patient by increasing the risk of falls or fractures. Non-pharmacological treatments, such as music therapy, can aid with the behavioral problems of dementia, such as agitation, without compromising the health of the patient. Purpose and research question: The purpose of this project is to analyze and report current literature pertaining to the use of music therapy as an intervention to reduce agitation in patients with dementia. The research question proposed is: Is music therapy effective in reducing agitation in patients with dementia? Review of Literature: After examining the literature, it was found that music intervention decreased agitation in dementia patients when looking at short term results. External factors influencing music therapy were examined and the aspect found to have the most significant result on decreasing agitation was the use of preferred music. The literature also showed that agitation can be significantly lowered when using music therapy in patients with different illnesses or conditions such as terminally ill patients receiving hospice or patients experiencing traumatic brain injury. Conclusions: While music therapy has been shown to be effective to decrease agitation for many studies, the effects are short-lived and possess numerous limitations. No study specifically recommended the implementation of music therapy into clinical practice immediately. Our group concluded that further research on the use of music therapy to decrease agitation in patients with dementia is necessary before clinical implication.

Poster # 142

The Efficiency of Multidisciplinary Interventions to Prevent Pressure Ulcers

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Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem Statement and Background: Pressure ulcers are a growing concern in many healthcare settings and lack

adequate prevention methods. Pressure ulcers are one of the leading causes of morbidity for hospitalized patients. When pressure ulcers develop many complications can arise. Current prevention methods include risk assessment scales, turning patients every two hours, and managing moisture, friction, and shear. Purpose and Research Questions: The purpose of this research was to compare and contrast interventions to prevent pressure ulcers. Finding a successful alternative prevention method is of great interest and need. Can pressure-relieving surfaces greatly reduce the rate of pressure ulcers? What are the most effective methods to reduce the incidence of pressure ulcers? Review of Literature: The research analyzed 14 articles to compare current methods on the effectiveness of preventing pressure ulcers. The research studies evaluated new alternative pressure relieving surfaces and how they can prevent pressure ulcers. The findings revealed that foam alternatives, continuous pressure imaging system, and air-fluidized beds are more effective than standard hospital beds. Research also found that pressure ulcer bundles reduce incidence, severity, and total number of pressure ulcers. Recommendations for Practice: Future studies should be done to determine a specific type of pressure relieving surface for all hospitals to incorporate into a standard of practice in all healthcare settings. Healthcare providers can implement multidisciplinary interventions to maximize the effectiveness of preventative measures. Alternative pressure relieving surfaces should be used along with traditional prevention methods to decrease the incidence of pressure ulcers. Continuing education for both patients and healthcare providers will create a better understanding of how to most effectively prevent ulcers before they become a problem.

Poster # 143

The Importance of Nonpharmacological Interventions in the Treatment of Neonatal Abstinence Syndrome

Sarah Douglas Mccall, Shannon Caroline Boyer, Sarah Schaffer Hardesty, Courtney Paige Rhodes
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Neonatal abstinence syndrome (NAS) is characterized by specific physiological symptoms that newborns express due to withdrawal from pharmacological substances. This is a growing concern as the CDC found that 6 out of every 1,000 hospital births in 2013 were NAS babies. The purpose of this literature review is to compare four non-pharmacological interventions for NAS including breastfeeding, non-stimulatory environment (dark room), positioning, and swaddling that appear to be beneficial in the recovery of NAS. The goal is to identify which non-pharmacological intervention or combination of interventions is most effective in the treatment of NAS. It is anticipated that based on the research, recommendations will be made about policies that hospital administration should implement for NAS in the NICU.

Poster # 144

Yoga and its Impact on Stress and Anxiety

Briana Kymari McIntyre, Savannah Camille Clay, Valeria Sanabria-Sugarman
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem statement and background: Stress and anxiety are problems faced by many college students. This affects not only their academic performance, but also their mental and physical well-being. This is not only a relevant problem for the students facing these issues, but also for health care workers in the community setting and their ability to offer solutions. Statistics reported regarding the prevalence of these symptoms show the significance of this problem among college students. Purpose and research questions: The purpose of this evidence-based project was to explore the effects that yoga has on decreasing levels of stress and anxiety in the college student population, and the following research question was considered: What effects does yoga have on stress and anxiety levels in college students? Review of Literature: The results found among various studies indicated that yoga helped with mental well-being, strengthened the immune system, reduced depression, as well as decreased blood sugar. Among these benefits, yoga also helped significantly lower levels of stress and anxiety. Although all these factors were found to be affected by yoga, this evidence-based project specifically focused on the effects it had on stress and anxiety in college students. Conclusions—Recommendations for practice: Finding appropriate measures to reduce feelings of stress and anxiety among college students is important to maintain physical and mental well-being. The studies discussed showed that yoga participation resulted in significant reductions in levels of stress and anxiety. For this reason, yoga should be implemented on college campuses, whether through curriculum-based or extracurricular initiatives.

Poster # 145

Strategies of Vaccination Promotion Methods in School-Aged Children

Sarah Ann Mihealsick, Molly Ann Faust, Samuel James Deford

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Introduction: In the United States (US), the number on unvaccinated people is growing, mainly in two groups: upper-income and lower income families. The purpose of this project is to review the best possible solutions that will encourage more parents to vaccinate their children. Among school-aged children (P), what is the effect of the current clinic-based vaccination method (I) in comparison to community nurse outreach vaccination methods (C) on the number of children who get vaccinated (O). Literature: Studies have presented that religious beliefs, philosophical ideals, and false perceptions of vaccines, largely propagated by social media, have been important factors in adding to this epidemic. Refusal of vaccinations not only affects the individual, but also those who are unable to vaccinated and without this defense, an outbreak could erupt. Possible solutions to this problem are face to face interventions, at home visits, and school clinics which could maximize the vaccination rates within the community. Conclusion: To address the two unvaccinated populations, different approaches must be made. To reach higher income households, patient outreach and education to address common misconceptions that would prevent parents from vaccinating their children. The other population of concern is the lower-income community. The best way to reach this group is to expanded the role of the community health nurse, specifically the school nurse, who can educate parents about the benefits of vaccines and address individual vices. A suggested alternative to this approach would be to implement school clinics in lower income communities, which would make vaccines more available, allowing the under- and uninsured members of the community access to vaccines. In order for this to be done, the Vaccinations for Children (VFC) program would have to implement a new policy to include under- and uninsured clients.

Poster # 146

Interventions to Reduce Medication Administration Errors (MAEs)

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Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Objective: To explore and determine the most effective intervention(s) that have been shown to reduce external interruptions/distractions leading to medication errors. Design:Analysis of twelve scholarly articles including four additional introduction articles and studies that discussed, observed and analyzed the effects of medication errors and interventions for improvement. Background:Medication errors are a prominent aspect of health care and medication administration. External interruptions have been found to be a primary contributing factor to MAEs. Therefore, interventions to prevent these external interruptions and MAEs should be evaluated to produce the most favorable patient outcomes. Methods: The method by which articles were found was by searching various databases such as PubMed, CINAHL, and Ovid. Search terms included variations of the terms "medication administration errors", "interventions", and "interruptions". Inclusion and exclusion criteria were utilized to include the most recent and relevant articles that most accurately answered the posed research question. These methods yielded eleven research articles that were used in the review of literature. Results: All of the interventions tested were found to be effective except for the didactic lecture implemented in Ford et al.'s study (2010). The interventions that were effective included technological interventions, educational interventions, visual cues to both the nurse administering the medications and multidisciplinary staff, delegation changes from the nurse administering medications to other staff, and various behavioral modification interventions. Conclusion: Overall, a majority of the interventions meant to reduce medication administration errors (MAEs) by distractions were found to be effective. Because of this, a multifactorial approach was deemed most effective at reducing these errors. This multifactorial approach should incorporate technological interventions, educational interventions, visual cues, delegation changes, and various behavioral modification interventions to have the biggest impact. This set of interventions will likely reduce MAEs and the external interruptions that cause them.

Poster # 147

Music Therapy and Cancer Pain

Chase Aaron Miller, Alex Ryan Bacon, Timothy H Ivy
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem Statement and Background: Music therapy has long been studied and implemented as a means of relaxation, and associated with a variety of improved health outcomes spanning multiple medical practices. This method of therapy has many attractive characteristics to both patients and health care providers such as low cost, easy implementation, and minimal risk for harm to the patient. Ineffective pain control is a current problem in cancer patients due to the complex nature of the disease processes that occur. Purpose and Research Questions: Complementary therapies have taken their place alongside pharmacologic treatment so as to achieve more adequate pain relief. With the wide variety of benefits and implementation options of music therapy, its effectiveness and limitations are often studied. Review of Literature: To evaluate its effectiveness, we analyzed ten of the most recent and relevant studies published. These studies were gathered with precedence given to those published between 2006-2016 and those in which the researchers gathered first-hand data using music therapy as their sole intervention targeting cancer pain. With these findings, encouraging conclusions can be made regarding the effectiveness of music therapy. In addition to the deductions made regarding this alternative therapy's value, data is also present comparing the effectiveness of different types of music therapy with feasible implementation for common practice. Conclusions: We concluded that music therapy is effective as a supplement to pharmacologic analgesia in reducing pain for patients on an oncology unit. The findings were clinically significant demonstrating music therapy as an easy, harmless, and effective option for pain management with a flexible style and low cost to the patient.

Poster # 149

A Literature Review of Substance Abuse Among Anesthesia Providers

Stephanie Sharon Nabors
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Rationale: Research shows that anesthesia providers are more susceptible to substance abuse than other healthcare providers. Preventative measures are being implemented in Certified Registered Nurse Anesthetist (CRNA) schools to educate these anesthesia providers on substance abuse. Because substance abuse continues to threaten anesthesia providers, more research is needed that is aimed at preventative strategies in the educational setting. Method: This literature review examined the risk factors, prevalence, and preventative measures regarding substance abuse among anesthesia providers. References were identified using PubMed and CINAHL using the following search terms: "anesthesia," "student," "stress," "substance abuse," "personality," and "nurse." Results: Research underscored that stress, career satisfaction, personality, and fatigue are major risk factors for substance abuse. Both students and certified healthcare providers fall prey to substance abuse due to ease of access, high job-related stress, and the highly addictive nature of anesthetics. Preventative measures currently include videos, support groups, wellness programs, and computerized documentation. A gap in the science exists about how effective these measures are. Future research should focus on preventative strategies in the educational setting to create a safer environment for providers and patients.

Poster # 150

Staff Nurse Perceptions of Their Role in Hospital Reimbursement via Nursing Sensitive Indicators and Patient Satisfaction

Madison McKinsey Patterson
Student's Department: Nursing Faculty Mentor: Swift, Shelia

Background: Nurses make up a high percentage of healthcare personnel working in a hospital setting. As healthcare professionals, much of their daily work is the provision of direct patient care. Nursing-sensitive indicators serve as a way to measure the impact nurses have in the promotion of quality care delivered. Existing research highlights the value-based purchasing system implemented by the Affordable Care Act. Yet, very few studies have explored nurse

involvement as a critical facet to this system. Method: This literature review provides a state-of-the-science addressing nursing-sensitive indicators regarding the delivery of quality care, hospital assessment related to value-based purchasing and the role of patient satisfaction regarding nursing care in the reimbursement of hospitals. The PubMed and CINAHL databases were queried using search terms such as "value-based purchasing," "nursing sensitive indicators," "quality care," and "hospital reimbursement." This review provides a synthesis of the existing data related to nurses' roles in value-based purchasing and the way that nurses take part in reimbursement efforts. Results: A consistent theme in the literature is that the HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) survey accounting for 30% of the total performance score and thus impacting funds allocated by the Affordable Care Act depends on patient satisfaction and therefore on nursing quality. Other studies acknowledged that nursing sensitive outcomes depend on many patient variables that may depict nursing professionals negatively, such as age and culture differences. A gap in the science exists regarding the nurse's perspective on their evaluation by these measures. Future research should serve to assess the clinical nurse's perception of the way their care impacts the hospital reimbursement and healthcare costs. Results from such research improve hospital reimbursement by targeting nurse clinicians to provide them with a more comprehensive understanding of the system and their role in performance at the bedside.

Poster # 151

Decreasing Cesarean Births After Epidural Administration

Abigail Elisabeth Pirie, Cole Jenkins Spencer, Mallory Cameron Mccullough, Ellen Maxwell
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem Statement and Background: Many women receive epidurals to decrease their pain throughout the labor process. While this is effective in enhancing maternal comfort, epidurals can contribute to an increased occurrence of Cesarean births because they limit the mother's ability to move, dull the stimulus to push, and increase labor time.

Purpose and Research Questions: Cesarean sections (C-sections) prevent the baby from experiencing the positive effects of a vaginal delivery. This paper explores the various research on interventions to decrease the occurrence of C-sections after epidural administration. Review of Literature: Researchers study strategies to promote vaginal deliveries and prevent C-sections. The peanut ball is used to mimic a squatting position and promote the baby's natural descent. Midwives and doulas utilize a humanized model to provide support to the mother and enhance her sense of control. Delayed pushing gives the mother the option to push when she feels the natural urge. Lastly, clinician pressure can lead to medically unnecessary C-sections. Conclusions- Recommendations for Practice: Nurses and patients should be educated about the benefits of the peanut ball, and they should be offered to laboring mothers. Midwives and doulas should be incorporated into the multidisciplinary team as they offer support in decision making for laboring women. Multidisciplinary teams should discuss incorporating a humanized model to place the mother more in control of birthing options. Delayed pushing allows the mother to choose when to push, which enhances her sense of control. Additionally, clinicians should be educated on communication strategies, to prevent mothers from feeling like they need to prematurely elect for a C-section.

Poster # 148

A Comparison of Alternative Therapies for the treatment of Opioid Addiction

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Opioid addiction is a rapidly growing threat to the health of the population of the United States. The problem is already at epidemic proportions, and still the number of new opioid addicts continues to rise. (Rudd et al, 2016). This opioid epidemic presents a number of problems. Perhaps most seriously of all, for a number of addicts, opioid addiction leads to death. Between 2000 and 2015, an estimated 500000 people died from overdosing on prescription opioid medications. (CDC, 2015). CINAHL and PubMed will be used to find literature. The search terms "pet therapy and opioid addiction", "acupuncture and opioid addiction", and "meditation and opioid addiction". The articles found will be compared to determine effects on opioid addiction. Opioid addiction is typically treated with prescription medications, such as buprenorphine or methadone, often in combination with counseling. Several nursing interventions have been

suggested as alternatives to these therapies. The purpose of our project is to compare and contrast the effectiveness of acupuncture, pet therapy, and meditation for the treatment of opioid addiction.

Poster # 152

Childbirth Pain and Non-Pharmaceutical Interventions

David Quillin, Megan Elaine Cross, Dena Stansberry Charles
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The experience of pain during childbirth is universal. It can be a long and painful process and has been described as the most physically agonizing thing a woman will experience in her lifetime. Therefore, finding methods and strategies for reducing pain throughout labor and delivery is important to the nursing profession. The therapeutic effects of physical touch may play a role in non-pharmacological reduction of perceived labor pain in mothers. The purpose of this project is to evaluate the effects of massage and acupressure on labor pain for the purpose of making recommendations for practice or additional research.

Poster # 153

Social Media Influence on Parental Vaccination Decisions

Mollie Elizabeth Ray, Natalie Blair Grossman, Jacqueline Greer Fitzgerald
Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Introduction: Resistance to vaccines is growing, and this puts society in a vulnerable position as previously eradicated diseases are beginning to reemerge. Healthcare providers are seeking effective measures to help parents make an informed decision whether to vaccinate their children. Social media is a popular outlet for news and information. Healthcare providers are noting the implications of social media has on parents' decisions to vaccinate their children. The purpose of this paper focuses on the use of social media to educate parents and therefore increase childhood vaccinations rates. Literature: As herd immunity becomes more difficult to achieve due to decreased vaccination rates, healthcare professionals are turning to social media to share information. Social media outlets like Facebook and Twitter are popular sources for vaccination information. It is important that healthcare professionals use these platforms promote pro-vaccination information and address anti-vaccination viewpoints. Conclusions: It is recommended that healthcare providers continue to use social media by sharing URLs containing medical facts regarding vaccination; they are then available on social media for educational purposes and sharing among individual profiles. Specifically, it is suggested that information communicated via social media regarding healthcare decisions include gist statements (straight forwards facts), interactive information that aligns with personal values, and information tailored specifically to parents.

Poster # 154

The Effects of Decontamination of Stethoscopes on the Rates of Hospital Acquired Infections

Caroline A Rhea
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Introduction: Hospital acquired infections are prevalent among health care settings. These infections are spread in various ways: from health care provider to patient and from patient to patient. Medical equipment harbors microorganisms, and therefore, the transmission of the various bacteria occurs. Specifically, stethoscopes have become a major concern in spreading certain bacteria. Such bacteria include, but are not limited to, Methicillin-Resistant Staphylococcus Aureus, E. coli, and P. aeruginosa. Research has been done to determine such significance, and based on various sources, there are steps that can be taken to prevent these infections. Review of Literature: This paper will examine literature discussing the incidence of stethoscope contamination, bacterial species that the stethoscopes harbor among health care settings, and the use of disinfection interventions to decrease the bacterial contamination among all medical equipment. Evaluation of the literature shows that this contamination is an issue, and with proper cleaning techniques, the rate of contamination decreases. However, further research is needed to show the impact these interventions have on the rates of hospital acquired infections. Conclusion: Compiling the multiple studies observed, one can conclude that stethoscopes do, in fact, harbor some degree of microorganisms. Hospital disinfection

policies vary based on facilities, but they require that all healthcare providers and faculty comply to the standards, ensuring that they are upheld. Overall, more rigorous procedures should be implemented in order for these infection rates to decrease. Better emphasis should be placed on disinfecting stethoscopes in between patients. Recommendations available include adding baskets outside of patient rooms, using LED lights visualize disinfection and implementing the use silver ion diaphragm covers.

Poster # 155

Prevention of healthcare-associated infections through daily patient bathing with chlorhexidine gluconate

Shauna Lynn Sells, Suzanne R Johnson, Tawayne Jodie Tucker, Samantha Jade Driskell

Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Healthcare-associated infections (HAIs) are costly and often deadly, leading to increased morbidity and mortality rates. However, in many instances these infections are preventable. The prevalence of HAIs continues to be a major problem plaguing the healthcare system, despite ongoing research for new infection prevention strategies. Our purpose was to evaluate the effectiveness of chlorhexidine gluconate (CHG) bathing in preventing the spread of pathogens and reducing hospital-acquired infections. We will include studies that implement the use of daily bathing with chlorhexidine, either as a liquid bathing agent or as pre-packaged CHG washcloths, and compare the rates of various hospital-acquired infections after CHG bathing to those after conventional care. Our literature will be obtained from CINAHL Complete, Web of Science, Cochrane Library and PubMed databases. Eleven studies will be included in our literature review. A recommendation on clinical implications will be made following the review of literature.

Poster # 156

Kangaroo Care in the NICU

Kate Richter Shult, Erica Sowell, Katherine Satterfield, Casey Shaw

Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Neonatal Intensive Care Unit admissions are steadily increasing and the stressful environment may have a negative impact on the physical and neurodevelopment of neonates. One approach to managing physiological stress and pain in the NICU is therapeutic touch, specifically kangaroo care. Implementing kangaroo care has previously been shown to decrease stress and pain in neonates, however it is unclear if it is effective for NICU infants. Kangaroo care poses minimal risk and is a low cost intervention to address the negative effects on the development of neonates. Literature review will include the following topics: kangaroo care, stress and pain levels of the neonate in the NICU, policies and procedures for therapeutic touch in NICUs. It is anticipated that recommendations for policy and implementation after further research will be made.

Poster # 157

Parental knowledge of Adverse Childhood Events and the effect on health and substance abuse disorders

Chelsea V Smith

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Events in a child's life, whether positive or negative, can have a deep, lasting impact. Adverse Childhood Experiences are any "stressful or traumatic" event experienced during childhood. This SAMHSA definition encompasses physical abuse, sexual abuse, emotional abuse, physical neglect, emotional neglect, mother being treated violently, substance misuse within household, household mental illness, parental separation or divorce, and an incarcerated household member. ACE are not uncommon events. After a literature review was conducted using references from PubMed and CINHAL databases, a gap in literature involving parental knowledge about links between ACE and substance abuse was identified. There is evidence connecting ACE to development of many health problems, including substance use disorders. While research shows that early intervention in combination with high levels of parental involvement may be the key to preventing substance use disorders and mental health disorders, there is not research concerning what parents actually know about Adverse Childhood Events and their potential lifelong effects. The specific gap being investigated is "What do parents know about the links between ACE and substance abuse and early intervention techniques to prevent substance abuse in the future?".

Poster # 158

Emotional Coping for Fibromyalgia

Starla Mikel Smith

Student's Department: Nursing Faculty Mentor: Anderson, Joel Gwyn

Coping is a term used to define how an individual handles an issue or problem in their life. Several types of coping exist. Cognitive coping is divided into problem-focused and emotion-focused coping. Problem-focused coping has been more widely studied and is typically referred to as the ideal form of coping as it targets managing the source of stress. Emotion-focused coping refers to regulating emotions that arise under stress.

Fibromyalgia is a medical condition characterized by chronic widespread pain and a heightened pain response to pressure. Emotion-focused coping as a form of coping for individuals with fibromyalgia addresses the toll a chronic illness takes on a person when the illness is permanent because it is difficult to remove the source of stress. A review of the literature on coping with fibromyalgia revealed a high association of depression and anxiety as well as a relationship between emotional distress and pain. Few studies have examined how emotions influence behavior and coping strategies. Emotion-focused coping may be a viable strategy for individuals with fibromyalgia. Future research will examine emotion-focused coping by analyzing personal illness blogs among individuals with fibromyalgia, to see how these individuals are dealing with the emotional toll of their disease.

Poster # 159

Recreated Culturally Acceptable Advance Directive for Persons Experiencing Homelessness

Whitney Lynn Stone

Student's Department: Nursing Faculty Mentor: Mixer, Sandy

Although the process of dying is a universal human experience, it often amplifies people's unique cultural differences. Persons experiencing homelessness (PEH) have unique barriers, challenges, and wishes for end of life care. Despite healthcare being considered a fundamental human right, PEH experience discrimination and multiple lifelong challenges accessing care. Therefore, PEH exhibit a greater need for dignified, meaningful advance care planning and advance directive (AD) completion. However, the literature reveals a gap in knowledge regarding these unique needs. This study will use the culture care theory and ethnonursing research method to discover if developing a culturally acceptable advance directive form for PEH positively impacts their completion of an AD and overall experience of advance care planning. Following a counselor-guided AD workshop, four to six PEH and six to ten student nurses will be interviewed. Data will be transcribed and analyzed using thematic analysis. Findings will contribute pilot data regarding the unique needs of homeless individuals and advance care planning; address the national call for reducing health disparity through culturally appropriate services; and may be useful for helping people of all cultural groups with dignified and meaningful advance care planning.

Poster # 160

Reducing Medication Errors: Exploration of Double-Checking and Sterile Cockpit Methods

Kelsey Brook Towe, Holli Joelle Barnes, Kaylee Karay Brace

Student's Department: Nursing Faculty Mentor: Bodiford, Shannon

Problem statement and background: Medication administration errors are commonly occurring problems within the hospital that can resort in adverse events, including death. Due to the significance of these errors, methods to reduce them need to be explored. Purpose and research questions: The purpose of this paper is to evaluate the use of double-checking and the sterile cockpit method and their efficacy in reducing medication administration errors in the hospital. The question being explored is: in hospitalized patients, what is the effectiveness of double-checking compared to the sterile cockpit method in reducing medication administration errors? Review of Literature: Data shows that double-checking is lacking in one, singular definition which has led to confusion and a lack of adherence. Other road blocks experienced with this method were a lack of time, interdisciplinary tension, and high costs that have also led to a lack of adherence. The sterile cockpit method is an aviation technique integrated into the healthcare system. It utilizes signs and the quiet zone to reach these desired results. It demonstrates promising data in the reduction of medication administration errors. Conclusions – Recommendations for practice: After evaluation of the results from all eleven

studies, there is not enough evidence to recommend either one of the methods. Studies exploring both double-checking and the sterile cockpit method were limited due to their data collection via self-report, leading to possible biases. Despite the limitations, both studies, especially the sterile cockpit method, show promising results that need further evaluation for more reliable information so an accurate recommendation can be made.

Poster # 161

Preschool Children: What they know about asthma and how they learn

Adaya Alexandra Troyer

Student's Department: Nursing Faculty Mentor: Wyatt, Tami

Childhood asthma is a growing societal problem that causes suffering for children and families. Short of finding a cure, the best way to address this health concern is to give children with asthma the resources they need to control their condition. Unfortunately, research and resources for young children with asthma are lacking. The authors hypothesize using age-appropriate education via technology, which promotes self-regulation with psychosocial elements, could decrease exacerbations and establish healthy habits. This qualitative, descriptive study uses in-depth semi-structured interviews and direct participant observation to explore preliterate children's (3-5 years) understanding of asthma causes, symptoms, and treatments and educational strategies for this age group. Preliterate children who meet at least 3 out of 4 of the National Asthma Education and Prevention Program (NAEPP) criteria are interviewed to determine cognitive development and understanding of asthma and are then allowed a free-play period to help determine the children's preferences for entertainment and educational tools. A systematic evaluation of texts (e.g., field notes, transcripts) will provide qualitative data to categorize and identify themes. Additional analysis will determine what elements of the entertainment tools are most attractive to children in this age group by evaluating time spent with the toys and children's physical and verbal responses during the play period. These data are the foundation to develop future educational materials that enhance cognitive understanding and health-related behavioral regulation in preliterate children diagnosed with asthma.

Poster # 162

The Effects of Cuddling in Neonatal Abstinence Syndrome

Morgan Brooke Vantrease

Student's Department: Nursing Faculty Mentor: Chyka, Deb

The incidence of Neonatal Abstinence Syndrome (NAS) resulting from in-utero exposure to opioids and other substances has increased significantly in recent years and continues to grow globally. Treatment results in lengthy and costly Neonatal Intensive Care Unit (NICU) stays and, in areas with increased incidence such as Tennessee, the care needed to support these infants may exceed the availability of nursing staff. Pharmacological therapies are needed to help infants with NAS withdraw safely. The author conducted a literature review to explore the use of non-pharmacological treatments for infants with NAS. PubMed and CINAHL databases were searched using the following keywords: "neonatal abstinence syndrome," "neonatal withdrawal syndrome," "treatment," "intervention," and "nonpharmacological." While there is mention of non-pharmacological therapies to console infants experiencing NAS; a gap exists in the science pertaining to effectiveness of such therapies on infants or the impact they have on nursing staff. Future research will examine the effectiveness of one non-pharmacological intervention, cuddling of the neonate. Further, the author will elicit the perceptions of nursing staff using semi-constructed, in-depth interviews to identify common themes. This study will generate scientific data that can build the foundation for future research on non-pharmacological therapies in infants being treated for NAS.

Poster # 163

Effectiveness of Music Therapy on Pain Reduction in Adult Cancer Patients

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Student's Department: Nursing Faculty Mentor: Acred-Natelson, Laurie

Introduction: Pain is an overwhelming side effect of cancer and cancer treatment. The seriousness of cancer pain and the side effects of cancer pain treatment have led researchers to look for alternative ways to treat pain. Music therapy has been explored as an inexpensive and simple way to alleviate the pain experienced by patients with cancer.

The purpose of this project was to review the research that presently exists regarding the effectiveness of music therapy in treating cancer-associated pain and recommend how it can be best implemented in the clinical setting. Literature: Music therapy has shown to alleviate cancer associated pain. Studies have demonstrated specific types of music such as classical music for 20-45 minutes will significantly decrease pain in adult cancer patients. Morphine in conjunction with music therapy was found more effective than morphine alone in reducing pain. Some researchers concluded that music therapy provided by trained music therapists was more effective; however, this is difficult to implement in a hospital facility. Conclusion: Based on this data, it is recommended that music be used to reduce pain in adult cancer patients. However, more studies are needed before a policy can be put into place, based on a lack of specific techniques that are most effective. Implementing findings from future research studies could result in an overall decrease in the pain experienced by adult cancer patients.

Poster # 164

Effects of Music Therapy in Minimizing Depression in the Elderly

Lauren Ashley Whited

Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem statement and background: With the number of elderly adults growing in the United States, the rates of depression among the elderly are also growing. Pharmacological treatments of depression can cause unwanted side effects, which can result in people not taking their prescribed medication. However, depression does not need to go untreated and more alternative methods for treating depression are becoming necessary. There are several alternatives to antidepressants including pet therapy, counseling, and exercise. One alternative that is becoming more popular is music therapy. Purpose and research questions: The purpose of this paper is to examine the effects of music therapy on depression in the elderly population. The question is does music therapy (I) improve depressive symptoms (O) in the elderly population (P)? Review of literature: There are many studies done on music therapy. This paper looks at 12 articles from within the past ten years to determine the effectiveness of music therapy for depression. Conclusions: The studies on music therapy are growing. 11 of the 12 articles in this paper found that music therapy was effective for depression. However, there were many limitations among these articles. More studies are needed in order to determine if music therapy is an effective treatment for depression.

Poster # 165

Evaluating Methods to Overcome Language Barriers in Spanish-Speaking Patients

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Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Introduction: With the increase of Spanish-speaking people living in the United States in recent years, there has simultaneously been an increase of patients with Limited English Proficiency (LEP) accessing the healthcare system. Without the ability to fully comprehend healthcare providers, LEP patients experience language barriers that affect their quality of care. The increasing prevalence creates the need for a standard effective translation method. The purpose is to compare and contrast approaches in the literature (ad hoc, professional: face-to-face, and professional: video & telephone) to overcome language barriers of the Spanish-speaking population in a clinical setting by measuring the outcomes: 1) patient satisfaction 2) cost and 3) time. Review of Literature: Ad hoc utilizes untrained persons. professional: face-to-face utilizes trained members of the hospital staff. Professional: video and telephone utilizes technology. The literature illustrates that ad hoc methods decrease patient satisfaction, increase hospital cost, and they are the most time-efficient. Professional: face-to-face methods increase patient satisfaction, decrease hospital cost, and they are the least time-efficient. Lastly, professional: video and telephone methods come between ad hoc and face-to-face methods. Conclusion & Recommendations: Based on the research gathered, using face-to-face professional interpreters is the most desirable and efficient option for LEP patients and healthcare providers. In future research on the topic, more consistency among the terms patient satisfaction, cost, and time are needed in order to come to a reliable conclusion.

Poster # 166

Exploring Black Women's perceptions of midwifery and antenatal care in Knoxville

Hannah G Yoder

Student's Department: Nursing Faculty Mentor: Hutson, Sadie

Introduction: Babies born to Non-Hispanic Black women are 3.5 times more likely to die of preterm birth (PTB) complications than Non-Hispanic White infants. Prenatal care can reduce PTB risk, however, Black mothers are 2.3 times more likely than White mothers to receive late or no prenatal care. Few researchers have investigated the historical impact that the experiences of Black "granny" midwives may have on this trend. This study seeks to explore how Black women in Knoxville perceive midwifery as an approach to antenatal care. Methods: Used qualitative descriptive design and semi-structured individual interviews with 6 Black women, ages 18 and older who were born and currently live in Knoxville, TN. Participants recruited through the community. Each 60-90 min. interview covered: Experience of antenatal care, Perception of midwifery, and Knowledge of granny midwives. Participant demographics were collected. Qualitative data analytics using NVIVO is being performed for themes within transcribed interviews. Conclusion: Currently in progress. The PI is analyzing data for final themes. Emerging themes identified (may be subject to change): Limited knowledge of midwifery options in Knoxville, Limited access to alternative options, Story of Black midwives not passed down, Potential benefits of midwifery service in the community.

Poster # 167

The Evaluation of Nonpharmacological Interventions With Neonatal Abstinence Syndrome

Sydney Mackane York, Chelsea Marie Hancock, Hannah F Ledbetter, Palmer Elizabeth Gleason

Student's Department: Nursing Faculty Mentor: Thompson, Kathleen

Problem Statement and Background: The prevalence of neonatal abstinence syndrome (NAS) is increasing, as is the need for evidence-based interventions to treat it. While both pharmacological and nonpharmacological methods are used, nonpharmacological methods are the focus of this review. One hospital's protocol for treating NAS includes the nonpharmacological interventions of swaddling, rooming-in, and decreasing stimulation. Breastfeeding may also help in treating NAS. Purpose and Research Question: To determine if the nonpharmacological interventions in this hospital's protocol reflect evidence-based practice and if the literature supports the practice of breastfeeding for the treatment of NAS. The research question addressed is: Do these interventions decrease adverse manifestations, length of stay, and need for pharmacological interventions in infants with NAS? Review of Literature: Swaddling may decrease excessive crying and pain in infants with NAS. Kangaroo care may calm infants with NAS, but further research is needed. Rooming-in can decrease the length of stay and amount of pharmacological interventions needed. No studies on decreased stimulation were found. As for breastfeeding, drug levels in the breast milk of women on drug therapy are low. Breastfeeding may decrease the length of stay and need for pharmacological treatment. Conclusions—Recommendations for Practice: The nonpharmacological interventions mentioned above may have positive effects on infants with NAS, including decreasing length of stay and need for pharmacological intervention, and should be included in their plan of care.

College of Social Work

Poster # 67

Effectiveness of the CLO's After School Program

Hope Anthony
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The after school program at the Knox County Public Defender's Community Law Office (CLO) provides enriching after school program for at risk children and youth in the community in grades 2nd-8th. The students are taught science, fitness, art, photography, cooking, and more. There are two after-school sessions weekly that serve approximately 40 children. Through a parental survey, the purpose of this study was to explore the effects of the program and behavioral and academic changes in the children who participated in the program in Fall 2016 and Spring 2017. This study also aims to assess parental satisfaction. The paper-and-pencil survey was given out in both English and Spanish to increase participation. The survey data was matched with the attendance records to better understand which activities the child attended in relation to program outcomes. Bivariate and univariate statistical analyses were conducted using SPSS to examine which components of the program received the highest satisfaction and whether they were associated with children's attendance record. The results of this study provided valuable information that will help the CLO improve their program and better serve students.

Poster # 68

Substance Abuse in Rural Communities and its Connection to The Child Welfare System

Abagail Morgan Booher
Student's Department: Social Work Faculty Mentor: Choi, Sunha

Research shows that anywhere from 60 to 80% of child welfare cases involve substance abuse and this is especially prevalent in rural areas. While the Tennessee Department of Children's Services (DCS) provides referrals for substance abuse treatment, there is still a large number of children coming into state's custody due to substance abuse in the family. This study analyzed a rural and urban county in Tennessee to determine if the location of the family and their access to substance abuse services effected their ability to keep their children in their custody. A secondary data analysis of the DCS records for 25 cases from an urban area and 25 cases from a rural area was conducted. Variables examined were county of residence, completion of substance abuse services, and whether or not the child remained in the custody of the caregivers. Univariate and bivariate statistics were used with SPSS to illustrate the prevalence of uncompleted substance abuse services (rural vs. urban) and how that was associated with children's custody outcomes. Understanding what barriers are in place for families trying to confront substance abuse might help raise the success rate in keeping families together and keeping children out of the child welfare system.

Poster # 69

Keys to Success: An Evaluation of the YWCA Keys of Hope Women's Housing Program

Roxanne Baker De Guzman
Student's Department: Social Work Faculty Mentor: Choi, Sunha

The YWCA Keys of Hope Women's Housing Program aims to provide clients with resources and services to aid in their transition of successfully completing the three main program goals: source of income, financial stability, and permanent housing. If one of those three components is missing, many individuals will find themselves in homeless situations. The purpose of this research is to determine if there are factors homeless women possess entering the transitional housing that will increase their likelihood of completing all three goals before exiting the program. This study analyzed data collected from resident files who exited the YWCA women's transitional housing program between January 2016-December 2016. In relation to the three outcome areas, this study explored eight factors: employment status, education history, social support, mental and physical health status, substance abuse history, criminal background, previous living situation, and personal program goals. Univariate and bivariate tests were conducted using SPSS. Analyses compared measures of the eight factors to the successful completion of the program, defined as achieving source of income, financial stability, and permanent housing upon resident's exit. Results were further analyzed to evaluate how the resources provided by the YWCA could better serve the residents in the transitional housing program.

Poster # 70

Dialectical Behavior Therapy for Clients with Major Depressive Disorder and Bipolar I Disorder

Christina Haley Emitt
Student's Department: Social Work Faculty Mentor: Choi, Sunha

Dialectical behavior therapy (DBT) uses behavior modification to incite positive changes in clients. The purpose of this study was to measure DBT's effectiveness in reducing thought-based and behavior-based symptoms for clients with major depressive disorder or bipolar I disorder. This study selected clients with a diagnosis of either major depressive disorder or bipolar I disorder who completed a 20-day course of an DBT-based intensive outpatient program at a local agency. For those who were selected, this study examined changes in their symptoms using two separate measurement tools from their agency records. First, the DASS 21 was used as a pre/post measurement for client-reported symptoms of depression, anxiety, and stress. Additionally, information reported by clients on daily diary cards was used to measure behavior-based symptoms and thought-based symptoms. The first day of treatment was used as a baseline by which to compare subsequent measurements. This study analyzed the reduction in clients' thought-based symptoms versus behavior-based symptoms, respectively, using univariate and bivariate statistics. The results were further analyzed within a diagnosis-specific context to determine whether greater symptom reductions occurred for clients with a diagnosis of major depressive disorder or for client with a diagnosis of bipolar I disorder.

Poster # 71

Factors that Influence Job Satisfaction for Child Welfare Case Workers

Denise Elizabeth Harris
Student's Department: Social Work Faculty Mentor: Choi, Sunha

Child welfare case workers are an important part of every community as they perform pivotal roles in troubled families, such as securing safety and permanency. Studies show that high turnover rates among child welfare case workers are a national problem. Since job satisfaction is closely associated with the probabilities of turnover (or retention), this study assessed perceived factors that are known to be associated with job satisfaction. Factors being considered were agency policy and procedures, safety, self-care, and overall job satisfaction. Surveys were emailed to approximately 145 case managers at the Department of Children's Service East Region. Univariate statistics were used to describe the characteristics that might influence high turnover rates for child welfare case workers. Bivariate statistics were used to test the relationship between longevity and job satisfaction. Potential limitations include low response rate, acquiescent responses, and weak internal and external validity. However, this study expects to bring awareness to the reasons surrounding high turnover rates for child welfare case workers. By doing so, it will attempt to alleviate the issues associated with excessive departures and help agency operations improve.

Poster # 72

Perceived Reasons for Homelessness and Perceived Barriers to Overcoming Homelessness

Holly Keeble Hill
Student's Department: Social Work Faculty Mentor: Choi, Sunha

Homelessness is an epidemic that affects individuals of all races, ethnicities, genders, ages and socioeconomic statuses. Homelessness is most often a result of the build-up of multiple negative life experiences and factors rather than the result of one particular event. This study aimed to understand reasons for becoming homeless and the barriers to overcoming homelessness, as perceived by homeless individuals in Knoxville. This study analyzed the data from intake interviews with 242 homeless individuals receiving services at a homeless shelter in Knoxville. These interviews were conducted over a one-month time period. Individuals included in the interviews were men and women above the age of 18, who were in need of using services provided by Knox Area Rescue Ministries. Univariate and bivariate statistical analysis were conducted using SPSS. There is a great amount of research that has been done on homelessness, but very little research has been conducted on homelessness in Knoxville, TN. By understanding these perceived reasons and barriers, there will be greater opportunity for service improvement at Knox Area Rescue Ministries, which could result in a decreased number of reoccurring episodes of homelessness.

Poster # 73

Exposing Gaps in Post-care Needs for All Amputees

Dallas Bailey King

Student's Department: Social Work Faculty Mentor: Choi, Sunha

All too often amputee survivors are not getting adequate post-care after discharge, and current literature shows how certain insurance types play a negative role in that. This study examined readmission rates for amputee within a sixty-day period at the University of Tennessee Medical Center in Knoxville, UTMCK by their insurance status. This study analyzed medical records of 108 patients, 18 years of age and older, who fall under this category between January 1, 2008 and May 31, 2016. By using quantitative research methods this retrospective analysis shows various percentages and correlations between readmitted amputee patients and their respective insurances, as well as the patients' place of discharge, and emergency department visits. The results show how these correlations involving insurance types result in the lowest quality of life for patients after discharge. This study further shows how bundling insurance through the Patient Protection and Affordable Care Act, PPACA, allows for additional patient and facility funding which support activities to improve the quality of post-care needs, lower unplanned readmission rates, and implement amputation revision prevention maintaining lower unplanned patient readmission rates pertaining to UTMCK.

Poster # 74

Impact of New Policy's Requirement on Individuals in the Intellectually Disabled Population

Lauren Scott Mohler

Student's Department: Social Work Faculty Mentor: Choi, Sunha

This study exists to explore the varying gaps with the Department of Intellectual Disability's new requirements in section 1915c Home- and Community-based Services waiver entitled "Employment and Day Services". For an agency to be eligible for reimbursement of services, the policy requires the clients be in the community for six hours a day. The policy lies in tension with the progressive movement of ethical service opportunity for the disabled population because the policy limits client choice. The research project examined the effects of the discussed policy on an agency in East Tennessee serving adults in the intellectually disabled population. The first phase of research examined clients who were currently funded for day services through the HCBS waiver (n=120) using agency data that quantified the effect of the enacted policy (e.g number days the policy was met, age of clients, reasons clients chose not to go in the community). The second phase of research involved an anonymous, paper survey distributed to the staff at the agency (n=50), which comprised of 10 Likert-scale items and 3 qualitative items. Univariate and bivariate statistics such as chi-square tests were run comparing variables as well as survey responses to explain further effects of the policy.

Poster # 75

Factors Associated with Successful Completion of an Intensive Long-Term Support Mental Health Treatment Program

Emma Jon Phillips

Student's Department: Social Work Faculty Mentor: Choi, Sunha

Inpatient mental health treatment facilities are important for individuals living with severe mental illness because they provide services to meet patient's basic needs such as food, water, shelter, psychosocial group activities, medication administration and monitoring, and support from staff and peers. The purpose of this exploratory study was to examine factors associated with successful program completion. This study included 30 adult men and women who received mental health treatment from an intensive long-term inpatient mental health facility between May 2012 and October 2016. The intensive long-term mental health facility used in this study treats males and females of at least 18-years-old who are experiencing some type of schizophrenia or personality disorder, or both. The factors that were examined include: duration of stay, diagnoses, current status (if the client is still there or if the client discharged), gender, the number of times the client was hospitalized or arrested during treatment, and the reason why the client left treatment prematurely, if applicable. SPSS was used to describe each factor and to test the relationship between these factors and successful completion of the program. This study is expected to provide information regarding the factors that contribute to a successful discharge from an inpatient mental health treatment facility.

Poster # 76

Research Analysis: Positive Implications of Animal-Assisted Interventions with "At-Risk" Adolescents in the Program H.A.L.T

Rachel Leeanne Stanley

Student's Department: Social Work Faculty Mentor: Choi, Sunha

The purpose of this research is to examine the effects that come from the use of animal-intervention with "at-risk" adolescents from the local program, Human and Animals Learning Together (H.A.L.T.). Each adolescent participant was residing in a residential facility within East Tennessee. Once selected to participate in H.A.L.T, they were then assigned a rescued dog from a local animal shelter for a four-week period and met twice a week with their dog. The program had the goal of preparing to dog for adoption, while having positive effects from the human-animal bond in the lives of the participants. This study analyzed the dependent variable of 20 pre and post survey responses from previous H.A.L.T graduates from Fall 2015, and solely 20 post surveys from the students during Fall 2016. The data from the surveys will be entered into IBM SPSS for logical batched and non-batched statistical analysis. The goal was to find positive correlations to prove the effectiveness of the program in creating feelings of "happiness", purpose, an increase in self-awareness, and an increase in basic canine education among those that completed the program. This research will provide more quantitative literature to be used in the future to continue establishing evidence-based, successful programs using animal-assisted interventions for adolescents and youth.

Haslam College of Business

Poster # 93

Business Plan

Eric Benjamin Alley
Student's Department: Business Administration Faculty Mentor: Graves, Thomas

People will always require shoes, and fortunately, a huge opportunity is arising in this industry in the Tri-cities area of Northeastern Tennessee. With the expanding population and growth of smaller businesses, the area presents an incredible opportunity to open a successful licensed New Balance store that will improve the lives of residents among the community. New Balance Tri-Cities will be located at 3135 Peoples Street # 301, Johnson City, Tennessee, 37604. The property is located at Peoples Plaza, a shopping center with restaurants, a physical therapy place, and several other complementary stores and medical businesses, creating an opportunity to succeed. This store will have a competitive advantage over businesses alike in that it will have both superior quality products and customer service. This area has the highest median household income of $42,817 in its Metropolitan Statistical Area. Though shoe stores do exist in the tri-city area, there is a huge opportunity for a higher-technology shoe store to enter the market. My goal is to open a licensed New Balance store in Johnson City. I will create a successful model for this opportunity as well as successful methods of starting this up.

Poster # 94

Starbucks: In the News

Caitlin Michelle Boone
Student's Department: Marketing/Logistics/Transporta Faculty Mentor: Mollenkopf, Diane A

Over the past 25years, corporate leaders have increasingly focused on integrating Corporate Social Responsibility (CSR) into the strategic management of their companies. The competitive environment of the 21st century has led to many companies adopting sustainability strategies related to environmental, social and economic performance. Part of the evolving business environment involves the growing role of the media in reporting on business activities – the positive, the negative, and the expected. As companies strive to implement social and environmental initiatives, firms and the media come together in telling the story. The purpose of this research is to explore the media's relationship with a company's sustainability initiatives over time. A single case study of Starbucks is the focus of the research because of Starbucks' well-known evolution in sustainability thinking and implementation. By tracking Starbucks in the news, this research explores how media exposure can drive corporate direction and/or reflect corporate initiatives to stakeholders.

Poster # 95

Hard at Work or Hardly Working? Examining the Relationship Between Fun at Work and Employee Engagement

Savannah Bailey Callaghan
Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Barksdale, Cheryl

We hear a lot about the types of "fun" that organizations are using to try and engage their employees at work. Yet, Gallup tells us that 70% of Americans are "not engaged" or "actively disengaged" in the work that they do. (2013). It is human nature to want to enjoy what you are doing. Conversely, we have all surely experienced a situation that was so boring, so utterly devoid of fun, that we did everything we possibly could to avoid the situation or make it go away. In the context of the workplace, an employee who is bored or unstimulated at work could be seen not taking his job seriously, or not putting forth the effort necessary for a job well done. An employee who does not enjoy work may put the company at risk of losing sales or angering customers.

In this research project, the connections between fun at work and employee engagement are explored by thoroughly examining previous studies done on employee engagement in a multitude of different companies, as well as analyzing data collected through a survey of local college students and local employees. By better understanding how the ideas of fun and engagement are related, companies can make better informed decisions when they choose what types of fun to implement in their workplaces.

Poster # 96

Aligning Tennessee: An Analysis of Nonprofits' Perceptions of Collaboration in East Tennessee

Hannah Myers Dunbar
Student's Department: Management Faculty Mentor: Miller, Alex

This study examines nonprofits' views and perceptions of collaboration in the East Tennessee region. By using the Consortium for Social Enterprise Effectiveness relationships with Knoxville and the surrounding area nonprofits, I use a qualitative approach to analyze how local social mission organizations view collaborating with the broader community. This analysis uses survey questions and open ended interviews to capture nonprofits' feedback. While the scales and questions are based off past literature within the area of focus, there are perspectives that are unique to the Knoxville community and surrounding area. The survey measured leaders' and employees' overall experience, funding associated with joint efforts, and homogeneous missions of collaborative partners. There was also an option to provide additional comments on each statement. I identified common themes of the leaders' perceptions of working with one another and compared these results to past literature and research. Common themes that influence collaborative willingness in the Knoxville area consist of organizations' missions and alignment of goals, financial security, and reputation of that organizations. This study's purpose is to provide a comprehensive report on common themes of collaboration so executive directors and other leaders in social organizations can allocate resources effectively to implement strategies that holistically address concerns in the community.

Poster # 97

The Consequences of Humanitarian Regulation: Evidence from Dodd Frank 1502

Charles Whitley Emerson
Student's Department: Accounting Faculty Mentor: Henry, Erin

My paper observes the economic and humanitarian effects of Dodd Frank 1502 on the Democratic Republic of the Congo and the surrounding countries. My interest in Dodd Frank 1502 and the "unintended consequences of western advocacy" stems from an interest in how the Securities and Exchange Commission assigned costs, specifically reporting costs, to humanitarian efforts to deter violence in the Democratic Republic of Congo. (Seay, 2012) I question if the Congolese people are truly "better off" under this trade regulation, and I plan to observe the change in "well being" of the Congolese people before and after the regulation was put into place. Conversely, I am interested in the reporting cost that this regulation has placed on companies that procure minerals from the African region. I question if the information that the disclosure gives to investors outweighs the cost of this disclosure. This research is important because findings could back or discredit the construct validity of Dodd Frank 1502 and could potentially incite reform of this regulation.

Poster # 98

DemoCart

Mikhail Ladhani Emmanuel
Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Youngs, Lynn

DemoCart is an online platform that caters to buyers who are looking to save money on their niche products without sacrificing brand quality or product selection. At DemoCart we tailor the goods that we offer to the customer through our open and collaborative community to ensure product demands are met. We use the aggregated demand from our customers to achieve wholesale prices from goods manufacturers, allowing our customers to feel the cost savings of being a big buyer. Our goal is to provide an interactive platform where our customers can provide feedback to help create a simple and exceptional buying experience.

Poster # 99

SeaBangla

Troy N Galyon

Student's Department: Economics Faculty Mentor: Graves, Thomas

Bangladesh suffers from a large transportation problem because of the poor infrastructure throughout the country. My business SeaBangla will combat the problem of inefficient travel in Bangladesh by becoming the first charter seaplane business in the country. SeaBangla will be located at the Hazrat Shahjalal International Airport in Dhaka, and we will primarily cater to the business and political leaders of the country as well as tourists to Bangladesh. The plane we will use is a DHC-6 Twin Otter that we buy from TransMaldivian Airways for $5.7 million. My primary contact in Bangladesh, Rasheq Rahman, is well known throughout the country and will help with local operations such as marketing, reviewing government regulations, and discovering new income streams for SeaBangla. I am requesting $7 million in startup capital for the cost of the aircraft, hangar, pilots, crew, and other operational costs. The loan will be repaid within four years if our income accrues as expected, and the problem of slow, inefficient travel through Bangladesh will be one step closer to being solved

Poster # 100

Ride Share App for the University of Tennessee, Knoxville

Julia Ganns

Student's Department: Accounting/Information Mgmt Faculty Mentor: Graves, Thomas

The company I am proposing to start is a ride-share app for the University of Tennessee, Knoxville. Many students are looking for ways to get home or to other destinations around the weekends and breaks. There are many different options to get to those destinations like buses, planes, your own car, having your parents pick you up, etc. I want to introduce a way of traveling that is superior to all those others forms of transportation in several ways.

That form of transportation is ride-sharing. Ride-sharing is the concept of one person offering rides to and from where they are going, to as many people as they please. This means the drivers will neither have to embark on the potentially long drive by themselves, nor will they have to carry the monetary burden all by themselves. The riders will be able to travel for a very cheap price and are able to avoid possible dangers related to other forms of transportation like busses. The idea behind my company proposal is to fill the need of students and to make this form of transportation more available to all students on campus, while reducing the risks that come with the original form of ride sharing.

Poster # 101

The Business Grind

William Gass

Student's Department: Accounting Faculty Mentor: Bell, John

The Business Grind is a coffee distributor offering green and roasted coffee to clients and customers in the Southeast. Focusing on high-quality, organic, and fair- trade green coffee, The Business Grind works to ensure the best coffee reaches the cups of consumers. We provide a platform for smaller roasting operations to be able to afford a constant flow of beans by being able to negotiate fair prices and provide coffee to roasters with contracts for deferred payment or contract roasting. Our target customers are small scale roasting operations for our green coffee, and for our roasted coffee, our target customers will be cafes, stores, businesses, and consumers. Our consumer focus will be on the Millennial generation. With consumption of high quality coffee increasing, there will is a need for a business that operates between large brokers and the smaller operations dedicated to small batches and specific beans. The Business Grind Operates as a cooperative for the roasters and leverages their combined buying power. The warehouse/ distribution center will be in Greenville, South Carolina. It will provide a location near ports and larger markets. By using excess capacity in others' supply chains, The Business Grind lowers costs to keep prices competitive.

Poster # 102

Does Increased Globalization Improve Citizens' Quality of Life?

Laura Elizabeth Hirt
Student's Department: Economics Faculty Mentor: Holladay, James

Countries are more open than ever to the outside world, however research is still undecided about what effects it will have on the country's culture and way of life. In a world where many policy makers are worried about the expansion of free trade and cheaper foreign labor, we are not certain how a country's strivings to reach this goal of more "open" economy will or will not give their citizens a better quality of life. I will attempt to gain insight into that question using the United Nation's millennium goals; my research uses econometric techniques to tease out possible connections between economic exports and imports over GDP, "openness," and the maximum, minimum, and average millennium development goals within a country utilizing data from 1965 until 2015. My work aims to pinpoint the factors present in a country such as political stability or population growth that are connected to the progress seen on increasing citizen's quality of life. I hope my research will make it possible for policymakers to understand how their work to reach these millennium development goals might be improved.

Poster # 103

reINVENT the Way You Think About Recycling

Taylor Leighann King
Student's Department: Business Analytics/Statistics Faculty Mentor: Gras, David

In America, 65% of the trash thrown away every day can be recycled, yet less than 22% actually is. That equates to adding a whopping 254 million tons of garbage annually to our 2,000+ active landfills. If stacked, the tossed office paper alone could build a wall 12 feet high from Los Angeles to New York. Despite recent efforts to change those numbers, the percentage of trash recycled hasn't changed in 20 years. As a consequence, there is a growing need for innovative and creative solutions in the recycling space. reINVENT is an entertaining upcycling workshop where guests ranging in age and artistic ability are able to create their very own work of recycled art alongside their friends, family, and coworkers through the instruction and guidance of a skilled artist. reINVENT seeks to educate the communities in which it operates about the necessity of recycling by presenting educational information in a non-threatening and entertaining way in hopes of reaching populations who have either been burned out by recycling themes and gimmicks or are unaware of the issue's severity. In order to accomplish this mission, every reINVENT class begins with a brief presentation about reINVENT's purpose, complete with recycling statistics and information about local recycling facilities. Participants will then create their own artworks using locally sourced recyclable materials which could reasonably be found in a person's home or office. In this way, participants will be able to hear about recycling as well as

begin to imagine what possible items could be "upcycled" rather than trashed when their apparent use is complete. For example, participants could take some wine bottles and fashion them into their own very own unique set of kitchen glasses, or use an old encyclopedia to make a jewelry box. The possibilities are as endless as the imagination.

Poster # 104

Knoxville Creative Co-working Space

Bradley Ross Landenberger
Student's Department: Business Analytics/Statistics Faculty Mentor: Graves, Thomas

One thing that is notable about Knoxville is its tightknit art community. Someone in Knoxville's creative scene can without a doubt get support from their fellow artists, but there are no open and rentable studio spaces in Knoxville that specifically support artists and creative entrepreneurs to work alone or collaboratively. This research project's goal is to understand how to establish a co-working space to cater to the greater Knoxville creative community. The space will feature multiple offices and work spaces that are rentable for anywhere from one day to yearlong leases. The idea for this project was conceived while looking at similar spaces in other mid-sized cities across the United States and speaking with Knoxville artists in the entrepreneurial, information technology, and fine art fields.

Poster # 105

Oh, the Places You'll Go!

Tucker P McLain
Student's Department: Accounting Faculty Mentor: Adeleye, Ifedapo

In a current business environment with ever increasing career mobility, students and graduates have even more choices of where they choose to begin their career. This study seeks to analyze the correlation, if any, between certain demographical, personal, and educational qualities and where students and recent graduates ultimately decide the location to begin their careers. All of these qualities can help create a profile to define how risk-averse or risk-tolerant a respondent related to their career decision-making. The fewer ties a person has to a city, the more risk they must assume when focusing their career search. This raises the question: what qualities most affect how students and recent graduates choose their first career location and how can companies use this knowledge to appear more appealing to applicants?

Poster # 106

The Feasibility and Impact of Autonomous Technology on Transportation Networks

Adam Clay Miller
Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Holcomb, Mary

This research is designed to understand better the impact autonomous technology will have on transportation networks. By understanding the potential impact of these new technologies, firms will be able to more quickly prepare for the changes and understand the benefits and challenges that may come along with the technology. New technology innovation has the potential to broadly disrupt the supply chain industry. Autonomous technologies such as self-driving trucks, drones, and further automation of last mile delivery could drastically change the playing field of the today's supply chains. With Supply Chain Management becoming more and more important to business's ability to cut cost, the capability to adapt to changes and best practices will be essential for continuing growth. The purpose of this study is to identify key trends among industry executives and academic research allowing for insights on the best applications for these emerging technologies.

Poster # 107

Head Over Heels: Women in Supply Chain Management

Mary Margaret Mobley
Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Mollenkopf, Diane

Being a woman in the Supply Chain Management major, I have seen the challenges females face in a male-dominated field. But why is it that we see so few women in executive roles in the Supply Chain field? Is it because of the gender challenges, or is there another underlying issue that is causing the lack of women in upper-level Supply Chain roles? What can we do to better prepare our generation of women in Supply Chain to help them be successful in pursuing their career? Through this research study, I will be hearing about the experiences entry-level women in Supply Chain face, and if these entry-level challenges are the reason why women are either not continuing to pursue a career in the Supply Chain field, or are not prepared for executive level Supply Chain roles. I hope to find themes across these experiences, and by having these, figuring out how corporation and we, The University of Tennessee, and our nationally ranked Supply Chain program, can better recruit and prepare women for the issues they will face in a male-dominated Supply Chain career.

Poster # 108

Sustainable Value Creation for Consumers at the Base of the Pyramid

Kathryn Elizabeth Pepperman
Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Tate, Wendy

The Base of the Pyramid encompasses the poorest segment of the global population consisting of roughly 4 billion people of whom do not have access to most goods and services. These people live on average spending $1.75 a day which does not leave room for disposable income to spend on many products more developed economies take for granted. Large multinational corporations, specifically Consumer Packaged Goods firms, have spotted a unique market

opportunity at the Base of the Pyramid. These consumers deserve access to products which are designed to simplify their lives, improve their health, and reduce the amount of labor required for daily tasks. So you might be thinking, "Why not donate the product to these areas?" Well, that simply is not sustainable for businesses looking to provide their products to consumers, and it also only impacts a few villages and towns. Also, if these products are donated, true, sustainable consumer value is not created. Value stems from the consumer and what they are willing to incorporate into their daily needs. Focusing on creating the right combination of both supply and demand, this study attempts to answer the question "How can multinational consumer packaged goods firms create sustainable value for consumers at the Base of the Pyramid?" In order to truly impact these communities and generate enough profit to operate, Consumer Packaged Goods companies, must simultaneously create market value for their goods while creatively optimizing their supply chains in order to be able to meet the demand they generate for products such as bug spray, detergent, soaps, and so on. For this study data was gathered on two fronts, through literature based research as well as numerous interviews on strategic approaches firms take in meeting the Base of the Pyramid challenge. Data gathered from both case-research as well as interviews with SC Johnson, Unilever, P&G, Kimberly-Clark, Johnson and Johnson, Newell Rubbermaid, Clorox, Colgate-Palmolive, Reckitt Benckiser Group, and International Paper was analyzed to highlight current strategies and trends for sustainably infiltrating the Base of the Pyramid.

Poster # 109

An Inquiry into the Effect of the 2014 Russian Sanctions on the European Gasoline Market

Eric Stephen Peters

Student's Department: Economics Faculty Mentor: Murray, Matthew

Since the implementation of Russian Sanctions and Countersanctions in 2014 resulting from the Russian Annexation/Invasion of Crimea, the economic ripples of these shocks have reverberated across Europe. The purpose of this study is to isolate the price effects of these sanctions specifically within the sanctioned energy sector for unleaded and diesel gasoline. We have used a difference-in-differences method to compare price trends from before and after the introduction of Russian Sanctions. Using a sample of 15 European Union countries, and differentiating between countries who rely heavily on Russian energy imports, we have found sufficient evidence for the effect of these sanctions on average unleaded and diesel gasoline monthly prices.

Poster # 110

Corporate Political Activity, CEO Hubris, and Earnings Management

Abigail Mary Rozanski

Student's Department: Accounting Faculty Mentor: Chyz, James

In this study, I examine the relation between corporate political activity and earnings management. I propose and test a hypothesis that CEO hubris moderates this relation. Consistent with the view that CEOs with relatively higher levels of hubris are more likely to expect that corporate political activity shields them from the costs of earnings management, I expect earnings management to be highest for firms with relatively high levels of corporate political activity that are run by CEOs possessing relatively high levels of hubris.

Poster # 111

A Comparison of the Perceptions of Authenticity Between Movies, Television Shows, and Advertisements

Madeline Marie Rule

Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Benjamin, Stefanie

The Expedia Traveler Report for 2016 established that travelers, especially millennials, want an authentic travel experience during their vacations (Millennial Traveler Report, 2016). Thus, this study explores how authenticity is perceived when destinations are depicted in movies, television shows, and Destination Marketing Organization (DMO) advertisements. The purpose of this study is to determine which of the three visual media outlets is perceived to be most authentic and whether that perception affects possible travel decisions to a destination. Using a mixed method approach, the researchers held three semi-structured, in-depth focus groups and distributed online surveys to gain a broad understanding of the perceptions of authenticity and how that perception applies to travel decisions. Participants watched clips from movies, television shows, and DMO advertisements filmed in Detroit, Michigan and New Zealand.

These destinations were chosen due to their real filming locations and popularity amongst movie (i.e. Lord of the Rings), television shows, and relevant advertisements produced by the DMOs location (i.e Pure Michigan, 100% Pure New Zealand). By understanding how people perceive authenticity, this study can help DMOs determine how to maximize their advertising budgets to see a higher return on marketing investment.

Poster # 112

Target Marketing: the Generational Differences

Elizabeth R Schofield

Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Schumann, David

This research will examine the role of three generational factors that are posited to predict attitudes toward target marketing and subsequent acceptance of target marketing. This study uses a survey method to examine samples of Millennials and Baby Boomers. The three factors to be studied include technology familiarity, perceived level of micro tasking, and value of time. Arguably these three factors characterize the difference in age, as Millennials are believed to be more tech familiar, have a higher level of micro tasking, while Baby Boomers have a stronger perceived value of time. All three are hypothesized to correlate negatively with target marketing.

Poster # 113

Trading the Pant Suit for a Paint Brush

Sara Elizabeth Seaman

Student's Department: Business Analytics/Statistics Faculty Mentor: Youngs, Lynn

I am a painter who seeks more for my art business and career than that of a "starving artist." Trading the Pant Suit for a Paint Brush is a business plan that serves as my blueprint and foundation for becoming a well-known artist, owning a personal studio and maintaining significant gallery presence across the country. I am to accomplish this through intentional customer targeting and production mastery. My target market is not specific to a certain demographic but instead a psycho graphic - original art enthusiasts and collectors. I am specifically targeting those who appreciate the value of original paintings through physical galleries, an online gallery, a monthly newsletter and social media. My evolving plan is split by stages - starting with an online gallery to later holding a large physical gallery presence and owning a studio - which encompass both short and long-term goals and milestones. I am to be consistent in continually researching artists in order to mold my product, informing my community and audience of new works and accomplishments, and adapting my business plan as I learn more about the market and where I fit. Each artist fits a niche based on whom they inspire, or emotionally touch, with their work - which is what I have found to be the primary motivator of purchasing original artwork. My goal is to become a successful, full-time painter through creating original, inspiring pieces that speak to others in a unique way.

Poster # 114

NAFTA in Mexico

Harrison Taylor Smith

Student's Department: Economics Faculty Mentor: Holladay, James

What are the impacts of free trade expansion in Mexico on Mexican migratory patterns? When controlling for typical economic indicators and fluctuations in currency, there appears to be a relationship between expansion of US-Mexico trade and Mexican net emigration. Increasing the sum of US trade as a share of the Mexican economy appears to limit numbers exiting Mexico while increased US trade with Mexico as a share of total US trade seems to relate to an even stronger increase in Mexican movement out of the country.

Poster # 115

Is Changing Your Layout Worth The Payout? The Impact of Office Layout on Employee Wellness and Reactions

Samantha Nicole Steichen

Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Munyon, Tim

With an increase in focus on company culture over the past few years, thousands of companies are spending millions of dollars to renovate their office buildings. These investments are occurring with no research that proves that certain office layouts benefit employees more than others. Research in this area could not only save companies millions

of dollars, but it could lead to an overall increase in employee wellness and reactions. The objective of this study is to find a correlation between the physical layout of work and employee wellness and reactions.

This study is broken down into 6 separate parts: physical workspace, workspace tension, job tension, job satisfaction, creativity, and collaboration. The results of this study comes from a mixed method survey that's purpose is to find if there are differences in employee attitudes and perceptions of jobs based on office layout. The target group for this survey is adults above 18 who have full time jobs. The survey over-collects data by not only asking participants about their workspace, but also by asking them questions about their industry, commute, relationship with supervisor, and the amount that work affects their health.

Poster # 116

PlentiFull Business Proposal

Tayler Amelia Tate

Student's Department: Logistics and Transportation Faculty Mentor: Youngs, Lynn

PlentiFull is a group-purchasing organization that will concentrate on meeting the purchasing needs of locally owned restaurants. The idea behind PlentiFull stems from the already successful business model of group-purchasing organizations in the medical industry, and applies this to restaurants. The concept of a group-purchasing organization is based on the basic logic of supply and demand; as demand increases, and supply is held constant, the price will drop. When taking this theory and applying it to locally-owned restaurants, it means that each of the restaurants will input their individual demands which will then be consolidated into one large unit of demand (or the volume of the purchase will increase). This in turn can be leveraged against the suppliers in order to drive down the costs of for each of the individual restaurants. PlentiFull will operate as a liaison between suppliers and restaurants facilitating a productive, working relationship. The PlentiFull software system will be the most crucial aspect of day-to-day operations for the restaurants as it will include an inventory management system, weekly demand forecasting tools and an easy-to-use cloud-based portal. PlentiFull is uniquely qualified to succeed in this industry as many local restaurant owners are keenly aware that they are being overcharged for the necessary product, but have no other options due to the fact that a group-purchasing organization, such as PlentiFull, is not abundantly available. Furthermore, by offering state of the art solutions to everyday problems, the chefs are able to focus on their core competencies of providing an excellent dining experience, while PlentiFull focuses on its core competency of procurement.

Poster # 117

Consumer Perception of Green Marketing: Exploring consumers' trust in claims of sustainability

Matthew Stephen Wright

Student's Department: Marketing/Supply Chain Mgt Faculty Mentor: Zablah, Alex

In recent times, a significant push for an increase in sustainable behavior has been felt in the business world. Consumers are responding to it and are even, often times, the proponents of it. This movement has brought on a need to understand how the consumer responds when products are marketed as being green. Some findings show that consumers have an increased weariness of "greenwashing" in the marketing materials that a firm presents to its public, and as a result, there has been growth in the popularity of third-party certifications across many industries. These certifications are intended to provide a firm and its offerings with unbiased, outside ethos. The purpose of this particular research is to explore how much the presence of those certifications actually affects the consumer's overall perception of a firm that markets itself as being green. The results of this research will benefit marketers by informing them of how best they should present their green practices to their public, and whether or not the acquisition of a particular certification is worth the time, effort, and resources necessary to acquire and retain it. This quantitative study, through experimental design, evaluates participants' perception, trust, and overall sentiment of a fictitious hotel after exposing them to one of four advertisements for the hotel. The results of this experiment are expected to show that consumers respond with more trust and a higher opinion of the firm's "greenness" when specific claims of sustainability are supported by a certificate.

Poster # 118

An Activities Analysis of Executive Time Allocation

Rani Hani Zaouk

Student's Department: Management Faculty Mentor: Smith, Anne

Time is considered a critical resource among executives in the workforce. It is the only factor in our life that we have no control over and that will keep ticking until our retirement. For that we have to use our time wisely. Being a successful businessmen or women involves more than natural and developed talent, it requires the use of that talent at the right time. But what are the defining characteristics of successful men and women in the workforce? This is a question that has been taunting most millennial during their college careers and post-graduation. The pressure from management above portrays the idea that we do not have enough time to complete all our tasks and improve our personal lives. We live in a world where we try and rate our achievements based on a work-life balance theory. In this research, I will be looking at the history of successful executives and how they spend their time through categorization and comparison of their activities. I will be extracting information from the Wall Street Journal's sequence of "A Day in The Life" articles. The archival data will be analyzed and I hope to study the effective use of time by several executives through content analysis of their activities in published day-in-the-life.

School of Art, College of Arts and Sciences

Poster # 1

Go... Outside?

Jayson E Alexander
Student's Department: Art Faculty Mentor: Staples, Carolyn

Outdoor activities among Americans as a whole have been decreasing according to data gathered over the past 20 years. Activities such as fishing, hiking and visiting state and local parks, U.S. Forest Service lands, and Bureau of Land Management lands have been declining since early in the 1990's. Through an investigation of the data I will illustrate the decline, as well as document the reasons currently used to justify the lack of outside activity. Using this data I will create an immersive experience to provide viewers a more positive perception of the outdoors in order to encourage more time outside.

Poster # 2

Bubble Boy and His Rooms

Joseph Grant Barbour
Student's Department: Art Faculty Mentor: Murphy-Price, Althea

My work examines the relationship between sexual identity and isolation, especially in the context of contemporary society. Today, we live in a society where we have been conditioned to document all of our mundane, daily activities. I create background scenes out of woodblock prints with collaged screen-prints and drawn elements for furniture and props. These backgrounds become bedrooms, bathrooms, and living rooms where my intaglio printed puppet, Bubble Boy, has sex, farts, and does other mundane, somewhat surreal activities. I slowly move my paper puppet and photograph each motion to make a stop-motion. Lately, I've been trying to make these puppets, sets, and stop-motion animations 3-D and not just 2-D while still using printed and drawn elements. I am interested in expanding the multiple realities my protagonist exists in as a mirror to growing multiple realities we exist in as a postmodern society with mass proliferation of sitcoms, reality television, and social media. Bubble Boy, my protagonist and an embodiment of certain elements of myself, can have sex, fart, and even completely fall apart, yet he never really changes or progresses. He is stuck in a purgatory-like state where his sole purpose is to be an entertaining puppet. He exists in a bubble that many of us inhabit where we feel the constant need to entertain or to be entertained. I believe this essentially postmodern condition has definite ramifications on one's own ego and on our society as a whole.

Poster # 12

Evolution of the Sneaker Culture

Jordan Katherine Beets
Student's Department: Art Faculty Mentor: Staples, Carolyn

There is a trend within the correlation of pop culture and the rise of the sneaker industry that our team is investigating. The questions that we are studying relate to the secret power of advertising through celebrity endorsers, spiking consumer interest in a certain sneaker brand or style. From this, our research targets those patterns found in consumers' actions in relation to these new trends. Most importantly, we are focused on how endorsers have ultimately acted as product testers to push the evolution of sneaker design within the past 20 years. The phenomenon that we are studying digs deeper than the rising costs and recognition of the industry itself. Our goal is to uncover and match the reasons for why specific sneakers have become so popular and how it is done. Our process includes attention to what exactly generates the buzz for sneakers and through what medium. The relationship between advancing technology and the rise of the industry has introduced a larger question of how the two connect.

Poster # 13

Normalizing Disability Through Design

Adelaide E Davis, Cameron Spooner
Student's Department: Art Faculty Mentor: Staples, Carolyn I

Those with disabilities, physical, mental and intellectual, are the same as the next, but somehow there is still a fear factor present in our world at this time. This is a problem that we feel strongly about as friends, family, and liaisons

of the disabled community. Our research is focused on the disabled community and how to facilitate change in the climate of our society and feelings towards them. We are challenging ourselves to create something that eliminates overt differences and to design to bridge the gap between volunteer helper and friend, sympathy and empathy, discomfort and freedom. Our research is inspiring us to create a work that everyone can enjoy and experience regardless of their physical or mental abilities. Through this experience each person will be able to point out the same heart and soul of a person thot he next through expression in a totally subjective, creature-filled world.

Poster # 3

One-Way: A Sound Installation

Zachary Jackson Edwards
Student's Department: Art Faculty Mentor: Ann, Jessica

Sound often acts as a descriptor, adjectives and adverbs that aid our visual experience. While these seen objects and experiences tend to have some auditory influence, sound often exists to enhance or further what the individual may see. On e-Way explores what occurs when this hierarchal way of perception is flipped and the descriptor becomes the described. This installation establishes a language with the audience in the form of a one-way listening system. An individual interacts with the input source, a microphone inside of a tight space. Other participants move around the output sources, separated from the input. These outputs exist as concrete boxes containing sand that act as sound dampening mechanisms (SDMs) and speakers imbedded within. The sculptural component of this installation serves as a tool to communicate with the audience specifically how to engage the input and output sources. Sounds emitting into the microphone, traveling through the SDMs, force participants to mute conversation and lean close in order to make sense of the muted audio. The result engages the audience to listen and not see. If a participant simply "looks", they will see stagnant objects. However, once engaged they will experience the sensation of listening as an active process.

Poster # 14

Visualizing the Stigma of Mental Illness

Rachel Gorman
Student's Department: Art Faculty Mentor: Staples, Carolyn I

Negative attitudes about mental illnesses often indicate a stigma, this can cause people to deny symptoms, delay treatment, and interfere with recovery. This stigma often prevents people from seeking help and, in the long run, causes more damage. Even though 89% of people agree that treatment can help individuals with mental illnesses, it is still very under-treated. In a 2004 report by the World Health Organization, 56% of people with major depression disorder and 57% of people with generalized anxiety disorder go undiagnosed. It's also acknowledged that these rates are probably lower than the actual number of people failing to receive treatment1. The majority of people who are dealing with mental health issues are not getting the treatment and help that they need. Through an investigation into the research and cataloging the issues related to the stigmatization, I will create an immersive and interactive experience to help the general population understand what it's like living with mental illnesses and hopefully dispel the stigma around this issue.

Poster # 8

Interactive Learning: The Sounds of "Bonne Chance"

Alex Ring Gray Wesley James Fowler
Student's Department: Music Faculty Mentor: Staples, Carolyn I

Bonn e Chance connects the classroom to the modern age through mobile devices, providing an interactive learning experience. The game is a designed as a course-companion for French 111 and 112 beginning language courses for college students. Instead of merely computerizing old teaching practices or creating grammar practice flash cards, we are radically re-envisioning the design of the learning experience. This project endeavors to build an "ecology of learning that extends beyond the four walls of an institution and engages [students] in ways that are exciting, empowering and culturally relevant" (Salen et al., 2011). The music and sounds behind Bonne Chance contribute to this ecology by curating an authentically French soundtrack of pre-composed and original music, stimulating the learning

environment, creating a sense of historical accuracy, and channeling the primary purpose of the game, which is to help immerse students in the French language. By conducting research into French composers and cultural trends throughout the ages, French musical history can be characterized as a diverse and central figure in the arts of humanity. French history has shaped human history, and its music sheds light on the roots of its global influence.

Poster # 4

Hip-Hop's Most Intelligent MC's

Sam E Hansen

Student's Department: Art Faculty Mentor: Staples, Carolyn I

My research focuses on how hip-hop lyrics have influenced our educational system and vice versa. Specifically, it will highlight some of hip-hop's most famous acts, and uncover who the most intelligent lyricists are. There has been a trend of MC's complaining about having to dumb down their lyrics to sell records. Because this trend seems to be growing, I would like to find out if these dumbed down lyrics are having an effect on the listeners. By using a formula, I can figure out what reading level is required to understand and interpret lyrics. "Hip Hop Word Count" is a database of over 50,000 rap songs dating back to 1979. Using these songs, they were able to visualize the data in relation to many real world topics. "Lyric Intelligence in Popular Music: A Ten Year Analysis" is another research project that was completed to find out which genres and popular songs over the past decade were the most intelligent. Through my research, I will be able to see if there is any correlation between one of the world's most ubiquitous art forms and intelligent levels.

Poster # 15

Folk Tales

Alisa K Harvey

Student's Department: Art Faculty Mentor: Staples, Carolyn I

Typically, fairy or folk tales originate in one place and are then passed down from generation to generation. These stories are usually directed toward children and often teach morals, give warnings, and explain nature. In this way, fairy tales preserve the culture and values of different groups of people. Although they often vary in settings, characters, and motifs, fairy tales often share universal themes such as love, courage, and good versus evil. Thus, different fairy tales from around the world celebrate different cultures, but also highlight their similarities. My goal is to use fairy tales around the world as an educational tool to help kids learn about other cultures and ways of thinking.

Poster # 16

The Push for Success in School Age Sports

Caleb Lester Jones

Student's Department: Art Faculty Mentor: Staples, Carolyn I

Thousands of athletes are on television every day for all the public to see their skills and root for their teams. However, none of these professional athletes started at the professional level. They all started playing at a very young age in hopes of one day getting to the pro level. Sometimes the drive for success comes from the athlete themselves, but sometimes the drive is from the parents of the athletes. To understand this phenomenon, I am diagramming students who are pursuing sports out of their own desire and students who are pursuing sports due to pressure from their parents or outside sources. These stats will be cross-referenced with the economic status of the students as well as the chances of ultimately making it to the professional level. I am also going to create an experience that will simulate the difficulty of making it in to any sport professionally for the viewers to see just how hard it truly is.

Poster # 5

Sneaker Popularity Study

Margaret Jane Moore Jordan Katherine Beets

Student's Department: Art Faculty Mentor: Staples, Carolyn I

There is a trend within the correlation of pop culture and the rise of the sneaker industry that our team is investigating. The questions that we are studying relate to the secret power of advertising through celebrity endorsers,

spiking consumer interest in a certain sneaker brand or style. From this, our research targets those patterns found in consumers' actions in relation to these new trends. Most importantly, we are focused on how endorsers have ultimately acted as product testers to push the evolution of sneaker design within the past 20 years. The phenomenon that we are studying digs deeper than the rising costs and recognition of the industry itself. Our goal is to uncover and match the reasons for why specific sneakers have become so popular and how it is done. Our process includes attention to what exactly generates the buzz for sneakers and through what medium. The relationship between advancing technology and the rise of the industry has introduced a larger question of how the two connect.

Poster # 17

Large Format Film Photography

Thomas Ryan Murr

Student's Department: Art Faculty Mentor: Lee, Paul P

My research this semester has focused on learning the process of black and white, large format film photography. Large format photography dates back to the 1800's with the View Camera and is still used today (with many refinements). These cameras use 4x5 inch film and mechanical processes to actually take the photo. After the photo is taken, the user then must develop the film and then print the photo in a darkroom. Though this art form is still present, it is far from popular. The move to digital photography has had a great impact on film photography, especially large format due to its size and time required to produce photographs. My researched has been on learning an art that otherwise could be considered lost. I was drawn to this form due to the incredible quality and detail it has over traditional 35mm film photography, and even some digital photography. Studying this form has given me a greater understanding for photography as well as the connections between art and science that come together to create images.

Poster # 18

Analysis of the factors that influence music preference

Layla Elizabeth Nami

Student's Department: Art Faculty Mentor: Staples, Carolyn I

My work will examine the wide variety of factors that influence an individual's taste in music. There is a common perception that human's ears were are tuned, biologically, to find certain notes and chords more audibly pleasing, but recent information from an article that sampled the reactions of people who had never experienced the sway of western culture found that they didn't have the same preference. I aim to prove, through my research, that music preference is not an inherent predisposition as it is often thought to be, but the result of a culmination of experiences (physical, social, psychological, etc) that changes and is affected daily. I will be creating a visual and possibly tactile representation of my findings, and am hoping to display and compare the amount of influence each factor holds. For this research, I will mainly be using Spotify's new website, "Insights", which uses the user listening data it acquires to construct stories and data sets that interpret the subject from unique perspectives and influences, such as "How weather affects music listening", mapping music listening worldwide, "How listening habits change with seasons", and more. I would also like to conduct my own surveys and/or interviews using subjects at my own university to get first hand information on what factors affect their music listening.

Poster # 19

Broken Bottles

Jack Westphal Petschulat

Student's Department: Art Faculty Mentor: Staples, Carolyn I

Living in an urban environment, the reality is that there are types of pollution that we come to accept as inherent parts of our man-made landscape. While debris builds up in the corners of our society, we usually focus on keeping walkways and high-traffic public areas clean of obstructive refuse, however some forms of trash remain. One such example is broken glass. Shards of broken glass can be found on most sidewalks, especially in an urban college neighborhood. A typical remnant of the weekend fraternization that takes place just off campus . By researching the impulsive actions behind the glass smashing, as well as the consequences others face from it, I hope to formulate powerful alternative means of prevention for this occurrence. Broken glass is dangerous, to people, plants, animals, and

machines, and there is absolutely no reason for it to be such a common part of our environment. My goal is to create a vehicle that I can use to change the public mindset and make students more mindful of their harmful actions.

Poster # 20

Bonne Chance Project Data Transfer

Sierra Renee Plese

Student's Department: Art Faculty Mentor: Staples, Carolyn I

With the goal of providing students with an interactive learning experience that immerses them in the culture and language of France, we have been developing a game in the form of an app. In working on the French App project, I have been tasked with learning Unreal Engine 4 to develop new game modes and more interesting ways of storing information for the player. I am currently developing an adventure-type level where the player can interact with objects and people from French history in a side-scroller space. To facilitate the transference of information to other team members about the structure of the game in Unreal Engine 4, I have developed a document that details all current knowledge about the game mechanics and story.

Poster # 21

Visualization of Research on Homeless Veterans

Sierra Renee Plese

Student's Department: Art Faculty Mentor: Staples, Carolyn I

144,000 veterans are homeless, 50% of these are disabled. The goal of this project is to provide viewers with information that will incite them to take action with the goal of reducing the difficulties facing homeless veterans. Using federal data sets documenting homeless veterans in America, focusing on race, age, ability and shelter use, I will create an infographic that is an immersive experience designed to inform the public about the homelessness of veterans in America and motivate them to be agents of change. This research will also consider what offerings of assistance are available from the U.S. Government and relief organizations.

Poster # 22

Bonne Chance

Timothy Sengaroun

Student's Department: Art Faculty Mentor: Staples, Carolyn I

In learning languages, an effective way to understand a culture is to be fully immersed into it. Bonne Chance ("Good Luck") is a mobile gaming app that redesigns how language is learned through mobile gaming. It is an application designed for courses French 111 and 112 that immerses the students into learning French language and culture through different eras. Currently in progress, our process is a collaborative effort from different departments divided into teams: Design, Coding, and Music. As part of the design team, we utilize our in-depth research to inspire our visuals, animations, and game mechanics. We focus on different ways to create an immersive world a user can travel within while learning the history of that time era. My research focuses on the historical visuals for the app. The point of Bonne Chance is not only to learn the language and culture of France, but to also feel as if you were there. I looked more particularly into the architecture of France, doing case studies and diagramming, to help with the visuals I would create for the game. Along with the historical value, I also researched into other game mechanics in what makes a game successful. I valued how the game narratives of characters were told, how game developers immersed a player into a world, and how typography is used in the menu options. I discovered how to reflect upon French architecture and history and how to apply them to my designs. Bonne Chance is a mobile gaming app that French 111 and 112 students can be immersed in French culture and language.

Poster # 6

Creative Collaboration: Exploring the Aesthetics of Bridging Music and Art with Code

Elise Camille Stephens

Student's Department: Art Faculty Mentor: Variego, Jorge

My work examines the convergence of visual art and music in improvised performance settings utilizing interactive computer coding. It seeks to engage in interdisciplinary collaborations with scholars and performers outside my major field of study. I am particularly interested in the aesthetics of artist László Moholy-Nagy and in the work of

performance artist Laurie Anderson. My path explores the visual counterpart of electroacoustic music by creating projected images that are controlled like a musical instrument. I "perform visuals". My goal is to bridge my studies in both the School of Art and the School of Music. The UT Electroacoustic Ensemble has provided me with an excellent environment for my search through travel and performances- fueling my desire for experimentation. Under Dr. Variego's guidance, I have studied creative coding theory while exploring personal expression. This research is completing its second semester and will culminate in a gallery exhibit and a performance at the Big Ears Festival 2017. I believe more rewarding and meaningful creative endeavors can be accomplished in a collaborative and risk-taking environment than in an isolated calculated one. My goal is to share what I have learned while making collaboration a life-long pursuit.

Poster # 23

The Impact of The White Helmets In Syria

Laurel Kathryn Tyree

Student's Department: Art Faculty Mentor: Staples, Carolyn I

The Syrian civil war, which started in the late 1900s, during the initial Assad administration, has received international attention over the last six years due to the increasing amount of uprisings, continued conflict and civilian casualties. What began as protests against the Syrian President, Bashar al-Assad, quickly developed into a handful of various rebel groups fighting against the President's regime. At present, Syria is divided up due to the presence of the regime, rebel groups and the Islamic State. Conflict between these groups has resulted in thousands of civilian deaths. Another reason the war has sparked international concern has been the use of chemical weapons, specifically the use of chlorine gas in barrel bombs, the nerve agent sarin, and sulphur mustard. Amidst the war and conflict, a group of Syrians chose to rise up and fight against the norm. Founded in late 2014, The White Helmets, also referred to as the Syrian Civil Defense, consist of men and women throughout Syria that work tirelessly to rescue civilians after airstrikes. Their involvement has led to over 78,000 civilian rescues, the number continuing to rise as they receive support and funding from international groups. Working with little to no proper rescue training, the men act upon the belief, taken from the Quran, that "To save one life is to save all of humanity," the White Helmets are effectively changing the course of Syria's war, instilling hope in the lives of thousands of civilians.

Poster # 7

Bonne Chance, Animation in App Development

Jonathan Andrew Young

Student's Department: General Science Faculty Mentor: Staples, Carolyn I

Bonne Chance is intended to be a companion for students enrolled in French 111 and 112. The project will take the form of an application for mobile devices that aims not only to provide an entertaining means of learning French grammar, but also to make the material meaningful through presentation of cultural and historical context though the game's narrative. Animation will be used to tie the world of the game together and lend authenticity to both the actions of the characters and the mechanics and style of the world of the animation, as well as sell the art style of the piece. Animation and the art style will be used to create a culturally authentic immersive experience for the player.

Poster # 24

Is College the only option?

Lian Jye Yuan

Student's Department: Art Faculty Mentor: Staples, Carolyn I

High school graduates are faced with life altering decisions, including whether to continue their education or enter the work force. There are many factors that influences a student's choice such as the perspective of family or friends, money and time. Some students were undecorated with the idea of "only college education can bring you success". My goal is to offer students an unbiased analysis of the possibilities as well as the struggles that individuals may encounter as the result of either choice. This information will take the form of a tool that students can use to guide them through the various facets of this question, and ultimately, arrive at an answer that is most appropriate for their own individual situation.

Tickle College of Engineering

Poster # 188

Spring City Kayak Launch and Amenities Design Project

Sydney Lin Adcock, Anna Lynn Sparks, Eduardo Adame, Logan Scott Elliott, Lauren Elizabeth Barnette, Michael Nelson Shaw

Student's Department: Civil and Environmental Engr Faculty Mentor: Retherford, Jenny

Exemplar Engineering was requested by SETDD to perform engineering calculations and prepare contract documents in order to improve the infrastructure in Spring City, Tennessee. The SETDD has been working with Spring City in an effort to construct a public access area on a 30-acre peninsula on Watts Bar Lake. Exemplar will be responsible for designing a small park area for the town of Spring City. The construction of this park area will be separated into different phases that coincide with funding. These phases include designing and constructing underground piping and utility work, a small restroom facility, a pavilion structure, an access road and sidewalk, a greenway, and an EZ launch. The EZ launch is designed to hold small watercraft items such as kayaks, paddleboards, and canoes in order to promote lake tourism in Spring City. The phasing of this small park project included design and analysis calculations from the Civil Engineering disciplines including, geotechnical engineering, structural engineering, water resources and environmental engineering, construction engineering, and site civil engineering. The city officials of Spring City are hopeful that this project will bring tourism to their city and boost the economy since the current population is less than 2,000 people.

Poster # 216

Crystal Mineral Synthesis: Anorthite and Microquartz

Alec Affolter

Student's Department: Materials Science and Engineering Faculty Mentor: Brown, Claudia

Silicate materials make up over 90% of the earth's crust. This includes quartz and the plagioclase feldspars anorthite and albite. Synthesis of these silicates proves useful by creating start up materials for experiments involving the formation of rocks for fluid/mineral interactions as well as carbon sequestration.

Poster # 222

Advanced Control of a Three--Loop Flow System to Support Load--Following and Advanced Concepts of Operation

Abdullah Al-Fadhili, William Thomas Gerding, Quang Thanh Phung, Jacob Tyler Reed, Ian Andrew Browning, Alec Ryan Gavin

Student's Department: Nuclear Engineering Faculty Mentor: Coble, Jamie

As the nuclear power industry evolves, the technology used in nuclear reactors should evolve with it. Reactors in our current nuclear fleet reach full power and maintains that level for the entire cycle of operation. This simple concept of operation results in minimal power fluctuations throughout the operating cycle, allowing a simple linear proportional-integral (PI) control to easily maintain desired set points for temperature and pressure. However, future reactors (e.g. small modular reactors) may operate under load-following schemes where power rates vary throughout the operating cycle. The ability to rapidly load follow allows nuclear power plants to complement the power that is produced from renewables (such as wind power) that could have abrupt changes on daily basis. This changing power production leads to xenon buildup that changes the reactor reactivity, making the system nonlinear. In addition to the xenon build-up, some advanced reactors have an intermediate loop that isolates the primary coolant from the balance of plant system; this introduces time delays, which also challenges PI control. These reactors will need a more sophisticated system to control key variables and actuators. A supervisory control system is proposed to maintain the desired power output and temperature and pressure setpoints. The proposed supervisory control system will change PI controller gains based on the power level to maintain system values while meeting desired response time and overshoot constraints. This control strategy is demonstrated on a forced flow loop system using LabVIEW and Field Programmable Gate-Array (FPGA) implementations. The results of the physical system are compared to simulation results from a MATLAB/Simulink model as well.

Poster # 189

Pistol Creek Restoration Project

William R Allen, Jason Chai, Maximillian Gordon Davis, Taylor Garrett Farrar, Scott Ryan Kimbro, Zachary Grant Wallen, Fangyi Tang

Student's Department: Civil Engineering Faculty Mentor: Retherford, Jenny

The objective of this project is to apply engineering processes to propose a reasonable design for restoration of Pistol Creek, located in Maryville. The watershed, located in the city of Maryville, has experienced negative consequences of growth. With an increasing cross sectional area, the watershed is disrupting the flow through the branching streams. Pistol Creek runs 2200 feet behind Sandy Springs Park. Stream erosion and bank failures have been observed on site, caused by a combination of instability and hydraulic erosive forces. This project was completed through several different engineering processes including geotechnical, water resources, and construction management. This project was completed through cooperation between the University of Tennessee Civil Engineering senior design class, and the City of Maryville engineers. The project scope was sent to the students from the City of Maryville, and was aimed as a project to simulate design in the engineering practice. The project was proctored by Dr. Jennifer Retherford, and mentored by Dr. John S. Schwartz.

Poster # 190

Compressive behavior of carbon fiber vinyl ester composites for marine applications

Zachariah Levi Arwood, Vivek Chawla

Student's Department: Civil and Environmental Engr Faculty Mentor: Penumadu, Dayakar

Carbon fiber reinforced polymers (CFRPs) have become of great interest for industries in recent decades due to its high strength to weight ratio. The benefits of mechanical properties afforded by CFRPs have been demonstrated in industries including aerospace, automotive, and marine, however, there is a dearth of studies related to the compressive behavior of these composites. In this study, carbon fiber with vinyl ester resin (CFVE) samples, used for marine applications, were prepared in accordance with ASTM standard D6641with fiber degree orientations of 0, 45, and 90 degrees using a combined loading compression (CLC) fixture. A portion of CFVE samples were allowed to soak in seawater at 40^{o}C for at least one month and the remaining CFVE samples were left in dry air to investigate seawater degradation effects on mechanical properties of the samples. The CFVE samples were subjected to compression load using 22 kip MTS uniaxial system to mechanical failure. Important mechanical properties including compressive strength and modulus are reported.

Poster # 223

Multivariate Analysis of Gamma Spectra to Infer Used Nuclear Fuel Characteristics

Amanda Marie Bachmann

Student's Department: Nuclear Engineering Faculty Mentor: Coble, Jamie

Current methods of used fuel characterization connect the gamma signatures of specific isotopes to the burnup and cooling times of the fuel through significant feature extraction and preprocessing. This project explores the use of passive gamma spectra and neutron emissions of used fuel to directly estimate the fuel burnup, cooling time, and enrichment through multivariate analysis.

The data used in this research were generated using ORIGEN-ARP. The data consisted of the gamma and neutron spectra of used nuclear fuel for various combinations of burnup, enrichment, and cooling times expected in future fuel reprocessing facilities. Burn up values range from 20-60 GWd/kgU, in increments of 5 GWd/kgU. Enrichment values were calculated based on the burnup value according to the general relationship:

$Enrichment$=0.31×$Burnup$0.65 (1)

and values of ±5%, ±10%, and +15% around the calculated value. Cooling times include 5, 6.5, 8, 10, 15, and 25 years after the end of the last cycle.

Multivariate analysis techniques, such as principal component regression and partial least squares regression, are applied to gamma and neutron spectra to estimate the desired fuel characteristics. These methods have previously

been used with the gamma spectra for used fuel characterization, although the full population of expected fuel types have not been previously studied.

Expected results of this research include specific gamma and/or neutron spectra to be used as identifiers for the characterization of used fuel. Independent verification of operator declarations of fuel characteristics adds another safeguards tool to the nuclear industry. This supports IAEA goals for detection and reduction of proliferation concerns in nuclear fuel reprocessing facilities.

Poster # 225

Use of Integrated System Sensor Detection Systems to Reduce Total Measurement Uncertainty

Kathryn Elise Bales, Tyler Scott Camarena, Weston Scott Bogart, Sarah Elizabeth Creasman, Eric W Nelius

Student's Department: Nuclear Engineering Faculty Mentor: Walford, Graham

As gaseous diffusion plants are being decommissioned, uranyl fluoride deposits in piping must be identified and safely disposed of. Previous methods for mapping the deposits utilize a portable scintillation detector positioned with either simple fixturing or handheld techniques, resulting in measurement uncertainties that are difficult to quantify. This method introduces a high probability of interference from human factors, and locations of deposits can be misrepresented. The method being investigated has a lesser chance of failure from human error and also reduces the exposure of workers to radiation, conforming to As Low As Reasonably Achievable (ALARA) standards. In this work, the insertion of the gamma detector into piping and other structures, as well as outside the pipe, allows for the detector geometry and position to be well known, increasing detector efficiency, while decreasing the uncertainty caused by human error. Mounted on a cart, a combination of a scintillation detector, a Light Detection and Ranging (LiDAR) system and an imaging camera are used to locate and quantify the buildup of radioactive material. A computer program that takes into consideration human factors will alert the operator when the devices reach a determined threshold. While further development is required, initial efforts show promising results.

Poster # 226

Non-Destructive Assay of a Gaseous Diffusion Plant

Stephen Barush, Thomas Wayne Smith, Cameron T Ubben, Zane Garrett Wallen, Cal Joseph Fosseen, Eleanor Paige Comer

Student's Department: Nuclear Engineering Faculty Mentor: Walford, Graham

Holdup detection and quantification has largely been undertaken using externally located scintillation gamma ray detectors such as that denoted as HMS4. Internal measurement approaches have been limited because of equipment availability and concerns for potential difficulties with an internally corrosive and contaminating environment. By re-evaluating the detection and system design approach for internal use, it becomes possible to make significant performance improvements for deposit detection and quantification. This is reflected in improved system sensitivity, gained knowledge and measurement speed. Our internal measurement system incorporates a 2.0" dia by 2.0" length NaI(Tl) scintillator, a LIDAR and an imaging camera and lighting system. Because this system, mounted on an internal "crawler" is able to observe gamma spectra without the presence of steel pipe attenuation, detection capability is transformed. It is able to quantify the emitted characteristic X-ray spectra as well as gamma ray emissions from 235U and 238U. The use of the LIDAR and the camera allow "visual" observation of deposits in near real time situations, together with an assessment of the deposit shape and other physical parameters. In our work, MCNP models are developed for several differing geometry scintillation detectors on robotic internal pipe crawlers. These are compared with external pipe detection geometry models. Model validity is experimentally demonstrated. While there are engineering applications issues with both internal and external pipe measurement, the analyses illustrate optimal selections for both measurements. We compare the MCNP models with an experimentally developed rapid model approach we have developed that allows a modeling of the deposit geometry in the space of minutes. This accommodates variability in deposit geometry and thickness to minimize quantification uncertainty. When used with the gamma ray energy spectra taken in measured proximity then prompt quantification of that deposit is accomplished and with QSNDA compliance. Detection geometries and data are presented to experimentally demonstrate the approach and measurement for both in pipe and out of pipe detection systems.

Poster # 227

Trajectory Distortions Associated with Positron Emission Particle Tracking

Zachary Reid Bingham, Matthew T Herald
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Positron Emission Particle Tracking (PEPT) is an emerging fluid flow technique. This work examines distortions associated with Positron Emission Particle Tracking. Tracers labeled with positron-emitting radioisotopes are introduced to the fluid. Through positron-electron annihilation two coincident gamma rays are produced. PET (Positron Emission Tomography) scanners detect these gamma rays and the positions of tracers are reconstructed through the use of a position detection and trajectory linking algorithm. This technique has been used to study systems such as flows through heat exchangers and turbulent pipe flows. However, when two tracers become close to each other the detected trajectory may switch from following one tracer to another. In PEPT experiments it is impossible to determine when and how many trajectories are affected by this phenomenon or how it affects the overall measurement. Through the use of simulation software, it is possible to prescribe movements of tracers inside a PET detector emulator. Data from these virtual scans is then analyzed using the same position detection and trajectory linking algorithm used in PEPT experiments. The detected positions associated with each trajectory are attributed to their corresponding prescribed trajectory. In a representative simulated experiment, the frequency of the tracer confusion phenomenon was low. While distortions were measurable, they were statistically insignificant.

Poster # 217

Developing an Experimental Setup to Study the Fluid Dynamics in Ventricular Catheters

Leegan M Boudreau
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Hydrocephalus is a condition where an excessive amount of cerebrospinal fluid (CSF) accumulates within the brain. This condition is one of the leading causes for invasive neurosurgery, and is found in about 5 in 1000 live births. To treat hydrocephalus, a brain shunt system is inserted into the lateral ventricle of the the brain, and the excess CSF is drained in to the abdominal cavity. The shunt system consists of a ventricular catheter, a differential pressure valve, and a distal catheter. These shunt systems do treat Hydrocephalus, but they have a high failure rate. Most implanted shunt systems have to be replaced within the first two years after surgery. In the last 50 years, there have been no significant improvements in treatment or progress towards prevention or cure. I am conducting research on the fluid dynamics within the brain shunt. To define the environment in the shunt, I am designing an experimental setup that will produce accurate and informative data. The main motivation for this research is to create a foundation that later research can build off of. By defining the environment in the catheter we can begin to understand how they fail and where improvements need to be made.

Poster # 228

Fabrication of Special Nuclear Material Ceramic Surrogates

Duncan Ryan Brocklehurst
Student's Department: Nuclear Engineering Faculty Mentor: Hall, Howard

Analysis of interdicted special nuclear material is an ongoing effort that is of importance to a number of government agencies including the U.S. Department of Homeland Security. Special nuclear material is unique in that it is often alloyed with a variety of metals (e.g. Ga, etc) to provide the desired crystalline structure and resistance to forming unwanted oxidation. As an academic institution, working with SNM is difficult due to the safety and security concerns related to the material itself. This projects seeks to highlight the initial development of surrogate SNM in an effort to develop a new set of forensic signatures that would be relevant to the nuclear forensics and nuclear safeguards community. The ceramic form of SNM is under investigation, in the form of Ceria and Gallia mixtures. Two methods are being pursued to investigate the characteristics of these surrogate compounds, at varying atomic weight percent (0-20%); scanning electron microscopy and X-ray diffraction.

Poster # 218

A Drill Guide Stabilization System for Acromioclavicular Reconstruction Surgery

Jake Allen Childs, Jarrod Kenderick Nachtrab, Austin Conley, Jason S. Seinfeld
Student's Department: Mech/Aerospace/Biomed Engr Faculty Mentor: Reinbolt, Jeff

The device presented is a drill guide stabilization system for acromioclavicular (AC) reconstruction surgery. In the "dog bone" AC reconstruction technique, a channel is drilled through the clavicle and the coracoid process where SutureTape™ is inserted into the channel and anchors the clavicle back into the correct position. The AC drill guide, used to ensure the alignment of the drill, can be difficult to grasp while drilling due to the small surface area of the guide and the torques translated from the drill. The presented device, an attachment system for current drill guides which consists of a handle and a buttress-shoulder support system, sets out to alleviate the problems associated with current drill guides. The handle provides better ergonomics for the drill guide and the buttress-shoulder support system, consisting of a 6061 aluminum arm attached with a shoulder pad that rests on the patient's trapezius, provides extra support while drilling. Using an accelerometer to measure the drill guide accelerations from drilling into a shoulder model and utilizing orthopedic surgeon feedback to improve the ergonomics of each design iteration, the presented drill guide stabilization system is currently being tested and the final prototype is anticipated to drastically improve the surgical procedure. This is a capstone project for BME 469.

Poster # 191

senior design roadway design

David Alexander Christie, Malachi Shayna Rosenfield, Andrew Charles Dacus, John Robin Hood, Ryne A Denton
Student's Department: Civil Engineering Faculty Mentor: Retherford, Jenny

The Tennessee Department of Transportation (TDOT), DENSO Manufacturing, and local agencies have agreed to develop a State Industrial Access (SIA) road to improve transportation access to the DENSO Manufacturing industrial site. This agreement was made in conjunction with the State Industrial Access Act, which was implemented to promote the growth of industry in Tennessee by providing efficient transportation access to industrial sites at no cost to the local businesses. These SIA roads are built free of charge to the business in agreement that the business continues to expand and stay located at the given site, thus bringing tax revenue to the state. TDOT has partnered with students and faculty from the University of Tennessee's Department of Civil and Environmental Engineering to design the completion of the access road. TDOT conducted a preliminary engineering review where they proposed a 0.5 mile-long road to be constructed in Maryville, TN at the Blount County site. Students from UTK's Senior Design team will be tasked with designing the road with respect to TDOT standards and the preliminary design suggested by TDOT.

Poster # 229

Comprehensive Modeling of Holdup Deposits for Internal and External Piping Measurement Systems

Eleanor Paige Comer, Zane Garrett Wallen, Thomas Wayne Smith, Cameron T Ubben, Stephen Barush, Cal Joseph Fosseen
Student's Department: Nuclear Engineering Faculty Mentor: Walford, Graham

The goal of this project is the design of a mobile radiation detection system capable of detecting uranium deposits within a piping system, such as those in a gaseous diffusion enrichment facility. This design will be useful for applications in the decommissioning of the existing facilities in the United States, one each in Portsmouth, OH and Paducah, KY. This design implements a scintillator detector mounted on a mobile cart powered by stepper motors. On the front of the detector will be a camera capable of detecting color within the pipe, which is particularly useful for detecting yellow associated with uranium. On the back will be a LIDAR three-dimensional laser imaging device capable of mapping the inside of the pipe to help locate deposits. Plexiglas will be used to form a protective casing around the scintillator, LIDAR, camera, and other supporting electronic systems. This project can be considered to be a proof of principle design and as such, will only demonstrate the capability of such a design and the science behind it. More work will be needed to construct a device capable of maneuvering through large, complex systems of piping in enrichment facilities and other nuclear plants.

Poster # 230

Southern Cooking

Asia Janell Conley

Student's Department: Nuclear Engineering Faculty Mentor: Hall, Howard

The objective of our research is to develop better analysis techniques for post detonation scenarios. For this presentation, the term "better" can be specifically defined as quicker and more accurate. The primary focus of my research is on melt glass, which is structurally similar to trinitite and has passed the appropriate benchmark to prove it. The recipe for our subject is produced through an algorithm called "NUKES". Once the recipe is produced, the melt glass is then made in our lab. Approximately one gram is mixed and then heated in a drop furnace at about 1500oC. Currently, the focus is shifting toward improving the understanding of the cooling process of our synthetic melt glass. The methodology, such as PXRD and SEM, will be discussed later in more detail.

Poster # 231

Structural stability of REE-PO4 (REE=Sm,Tb) under static pressure and swift heavy ion irradiation

Jacob Edward Cooper

Student's Department: Nuclear Engineering Faculty Mentor: Lang, Maik

Rare earth element (REE) phosphates (REE-PO4, where REE is a rare earth element or yttrium) have attracted much attention in recent years. Due to their chemical flexibility and structural durability, these compounds are being investigated as a possible host matrix for long-term, high-level radioactive waste storage. REE phosphates crystalize into two main structures, monazite and xenotime, both of which are being studied as a host matrix for radioactive waste. To test their response under extreme conditions, we have performed two experiments using SmPO4 and TbPO4 with the monazite and xenotime structure, respectively: (i) irradiation with 1.1-GeV Au ions to high fluences, and (ii) static compression to very high pressure using diamond anvil cells (DACs). Synchrotron X-ray diffraction (XRD) at the Advanced Photon Source and Raman spectroscopy were used to study the structural response of each phase as a function of pressure or irradiation fluence. Under high pressure, SmPO4 remains stable in its monazite structure up to 41 GPa, while TbPO4 transformed from the xenotime to the monazite structure around about 11 GPa. Both sample compositions underwent a crystalline-to-amorphous transformation after ion irradiation with comparable fluence dependence.

Poster # 208

Lifetime Prediction of FeCrAl Alloys through Statistical Modeling and High-Temperature Cycling

Christina Lynn Cox, Josh Cody Turan

Student's Department: Material Science/Engineering Faculty Mentor: Rawn, Claudia

FeCrAl alloys are widely used at high temperatures in aggressive environments due to their exceptional resistance to oxidation, and the growth of the protective alumina at 800-1400°C has been extensively studied. Less is known about the cyclic oxidation behavior of these alloys, and three cast FeCrAlY(Hf) and two oxidedispersion-strengthened (ODS) FeCrAlY alloys have been tested at 1200°C for 1000 h. The effects of alloy composition, cycling period, and grain microstructure on deformation during thermal cycling were determined using a Keyence 3D optical microscope. Oxide formation, cracking, and spallation were characterized through mass change measurement, scanning electron microscopy, and image analysis. Frequent (1h) thermal cycling greatly increased scale spallation and crack formation in the alloy, leading to a decrease of the alloy predicted lifetime. These results were used to improve cyclic lifetime models developed for Ni-based alumina forming alloys.

Poster # 232

Improved PEPT Radiotracers Comprised of Ga-68 for Flow Diagnostics

Sarah Elizabeth Creasman

Student's Department: Nuclear Engineering Faculty Mentor: Ruggles, Arthur

Radiotracers are used frequently in medicine for diagnostic purposes. This work examines the use of gallium as a radiotracer for Positron Emission Particle Tracking (PEPT) in order to provide better imaging in flow measurements. In order for PEPT to perform, there is a requirement for particles to have 100 μCi (3.7e6 Bq) of activity per particle. In this research, there are on---going efforts to explore 68Ga as an isotope to provide the necessary activity for accuracy in measurements. Gallium---68 (half---life of 68 minutes) is produced from a generator, and it provides both economic and

practical advantages when compared to other radiotracers. One of the limits to using 68Ga is the low total concentration of 10---9M eluate from the 30 mCi generator. Thus natural (or non---radioactive) Ga must be added to the solution so as to have GaCl3 precipitation occur. Results from theoretical and experimental methods have been obtained. The particle size of GaCl3 was found to be around 1.9 μmeters when concentration was between 1.6e---4M and 1.4e---1M using the Mastersizer 3000 Particle Size Analyzer; this did not agree with the predicted results of the particle size increasing with increasing concentration. Since this particle size cannot provide enough activity per particle, some opportunities for further research include vacuum filtering (evaporation) of the eluate to increase concentration of 68Ga. Furthermore, the inclusion of 18F into the Ga solution can precipitate 68Ga18F3 as a radiotracer so as to achieve the necessary activity per particle requirement.

Poster # 233

Effect of Grain Size on the Irradiation Response of Actinide Oxides

William Fredrick Cureton

Student's Department: Nuclear Engineering Faculty Mentor: Lang, Maik

Nuclear fuel materials are subject to extreme conditions in a reactor such as high temperature and radiation. This leads to physical and chemical changes in the materials, for which the underlying mechanisms are not fully understood. In this study, the effect of grain size on the fission-fragment damage accumulation was investigated. Microcrystalline and nanocrystalline samples of UO2, ThO2, and CeO2 irradiated with 950 MeV Au ions and subsequently characterized by synchrotron X-ray diffraction and transmission electron microscopy. All materials retained their fluorite-type structure after irradiation with an increase in unit cell parameter as a function of ion fluence (except microcrystalline UO2). The relative magnitude of volumetric swelling was in each case larger for the nanocrystalline samples as compared to their microcrystalline counterparts. The relative radiation response between microcrystalline and nanocrystalline samples was smallest for ThO2, but showed a significant difference for CeO2 and UO2. The grain size of nanocrystalline UO2 and ThO2 increased as a function of increasing ion fluence (grain coarsening), while CeO2 showed a grain-size reduction with increasing radiation (grain fragmentation).

Poster # 179

"Engineering a Transfer Vector for Lentiviral Co-Tansduction of the Bioluminescent lux Gene Cassette into Human Cells"

Grant Thomas Dilliha, Jeffrey Scott Dixon

Student's Department: Chemical and Biomolecular Engr Faculty Mentor: Ripp, Steven

The lux cassette is a system of five genes (luxABCDE) found in bioluminescent bacteria that is responsible for creating both a light producing luciferase enzyme, and the chemical substrates catalyzed by this enzyme to produce light. The unique ability of this system to create both enzyme and substrate is significant because it allows for in-vivo autonomous bioluminescence without the need to externally add substrate. Despite the significant progresses in the applications of the lux imaging technology in biomedical research, there currently lacks an efficient approach for delivering the lux cassette into difficult-to-transfect cells, such as stem cells. Although lentivirus-based gene delivery has been demonstrated to be a promising approach for delivering foreign DNA, the relatively large size of the lux cassette limits its delivery using this approach. Our hypothesis is that by splitting the lux cassette into two components with each component cloned into separate lentiviral vectors, the lux cassette can be efficiently introduced through co-transduction of two lentiviruses each containing part of the cassette. To this end, by using molecular cloning techniques such as restriction digest, ligation, and Gateway cloning, we have successfully created a lentiviral destination vector containing the luxCDE genes (substrate genes) driven by a CMV promoter. This vector makes up half of the co-transduction delivery system and is ready for packaging into lentivirus for transduction into human cells pre-transfected with the luxAB genes to validate its functionality.

Poster # 204

Predicting Patients' Outcomes in Abdominal Wall Reconstruction Procedure

Danika M Dorris

Student's Department: Industrial Engineering Faculty Mentor: Khojandi, Anahita

Despite the improvement in techniques for abdominal wall reconstruction procedure, the operation can still result in major complications, and possibly death. We investigated historical data to determine the factors contributing to complications in past patients to guide future decisions regarding hernia repair patient care. More specifically, we retrospectively analyzed patient demographics and intraoperative factors (a total of 60 features) collected from 102 patients who underwent open abdominal wall reconstruction over 49 months from 8/11 to 9/15 at Halifax Health in Daytona Beach, FL. Out of 102 patients, 29 experienced wound complications following surgery. We used the random forest classifier to develop predictive models that can stratify patients based on their outcomes. We used parameter elimination and bootstrapping approaches to improve the accuracy of the models and objectively evaluated them using leave-one-out cross-validation. Our proposed model uses nine features and results in the overall accuracy of 75%. Consistent with clinical intuition, body mass index (BMI) and previous preoperative wound infections consistently appeared among the most important contributing factors to wound complication following surgery.

Poster # 192

The development of physical structural dynamic models

Codi Joshua Drake

Student's Department: Civil and Environmental Engr Faculty Mentor: Wierschem, Nicholas

Accounting for mechanical vibrations is crucial to the success of any stable structure. To gain a better understanding for how dynamic loads effect structures and how their effects can be mitigated, a physical test structure was designed. The design of the structure had to be such that it was capable of attaching multiple stories, multiple devices or weights, and had to allow the structure to attach to a small-scale shake table. The design also had to be flexible enough to allow for the structure to have adjustable centers of mass and stiffness, as well as able to undergo large displacements before yielding. In the later stages of this project, a tuned mass dampener (TMD) and a nonlinear energy sink (NES) will be designed and constructed for use on the test structure. NES and TMDs are two different types of devices that both function to reduce the effect of dynamic loads on structures. The use of these devices will provide experimental data to model how structures respond to dynamic loads.

Poster # 234

Comparison of ThO2 and UO2 fuel rods using the BISON fuel performance code

Devon L Drey

Student's Department: Nuclear Engineering Faculty Mentor: Wirth, Brian

Thorium dioxide (ThO2) has been considered for use in light water reactors (LWRs) as a potential alternative and accident tolerant fuel form to uranium dioxide (UO2). This study compares the thermophysical properties, axial temperature profiles, and radial temperature profiles as well as simple fission gas behavior of ThO2 fuel rods to those of UO2 fuel rods using the finite element BISON fuel performance code. The rods are modeled after the Peach Bottom BWR using 14 foot long rods under steady-state operating conditions. ThO2 has a higher thermal conductivity and less thermal expansion, giving ThO2 lower temperature profiles, less swelling that can stress and rupture the cladding, and potentially lower thermal stress profiles that may form cracks across the fuel rod. BISON results reflect these points, showing 5-10% lower temperatures in the ThO2 fuel rods throughout the entire 4.8 year cycle. Lower temperatures across the ThO2 fuel rod aid in fission gas retention, and therefore result in lower plenum pressures by as much as 1 MPa late in cycle. These points are highly attractive in accident tolerant fuel where low thermal expansion and flatter temperature profiles are desired to reduce the probability of cladding failure. Further studies will be needed to fully understand the stresses that form in the fuel and cladding, but ThO2 shows promise as an alternative/accident tolerant fuel.

Poster # 246

Development of Laminography Imaging Using Lab X-ray Source

James N Eun

Student's Department: Physics and Astronomy Faculty Mentor: Penumadu, Dayakar

Recent advances in manufacturing and complex materials call for development in imaging tools to characterize materials non-destructively. It is critical to visualize materials in 3D spatially to obtain quantitative information of microstructural features, to create a better understanding of its deformation behavior under external mechanical loading. Laminography is a non-destructive method similar to computed tomography. The primary difference being that the sample is rotated at an inclination rather than at 90 degrees to beam direction as typically used in tomography. Laminography provides the ability to characterize large plate type geometry not suitable for tomography due to large path length in certain orientations. The information is extremely useful for relating visual 3D reconstructed microstructural features to predict relationships of its mechanical properties. high resolution micro x-ray laminography (MXCL) was developed to perform non-invasive and quantitative characterization of fiber reinforced polymer composite laminates. Raw 2D laminographic projections are normalized and reconstructed using reconstruction software to visualize the sample in 3D. Microstructural information like fiber dimensions, orientations, volume fractions, and defects such as cracks and voids are quantified. Research focuses on structure-process-property relationships as part of the characterization group within the Materials and Processing group of the Institute for Advanced Composites Manufacturing Innovation.

Poster # 224

Tungsten Deposition Analysis Using Inductively Coupled Plasma Mass Spectrometry

Lauren Ashley Finney

Student's Department: Chemistry Faculty Mentor: Donovan, David

The Plasma Materials Interactions Research Group at The University of Tennessee Knoxville (UTK) performs collaborative research with Oak Ridge National Lab (ORNL), Sandia National Lab (SNL), and the DIII-D tokamak, the largest magnetically confined fusion experiment in the U.S. Deuterium (D) fuel particles heat and ionize to form plasma on the order of 100 million oC, allowing the D atoms to collide, fuse, and release energy. Graphite probes are inserted in the tokamak to sample impurity particles penetrating the plasma. The impurities coming from plasma-induced erosion of the walls cause radiative power loss when in the plasma. The probes are analyzed at UTK to gain information regarding impurity transport, erosion, and re-deposition processes. The main interest is tungsten (W), which has been chosen for use as a first wall material in next generation fusion devices because of its high heat capacity. DIII-D used toroidal rings of natural and W-182 enriched coated tiles in the divertor, which left deposits on the graphite probes in the device. The enriched W-182 coating of the tiles creates a unique isotopic fingerprint that allows eroded particles to be traced and detected at other regions of the device.

Poster # 171

Strawberry Plains Pike : Senior Design Project

Lila Holmes Fisher, Bryan Christopher Agee, Christopher Robert Smith, Shelby Woodson Smith, Curtis Ryan Broadbent

Student's Department: Civil Engineering Faculty Mentor: Retherford, Jenny

Tennessee Department of Transportation (TDOT) provided an opportunity to evaluate an intersection in a growing area of Knoxville, Tennessee. Citizens and TDOT employees noticed an increase in traffic volumes and possible excessive queue lengths at the intersection. TDOT noted that due to recent growth within the area the traffic volume may have increased beyond the capacity of the intersection. This increase in traffic volume produced a concern for the safety of vehicular and pedestrian traffic; thus, Three Bridges Consulting was contracted to perform a traffic analysis of the intersection and provide a design improvement if needed. TDOT personnel received statements of excessive queuing in the I-40 westbound turn lane of Strawberry Plains Pike. The queue was reportedly extending into the northbound thru lanes of Strawberry Plains Pike during peak hours of the evening. Therefore, the cooperative agencies involved in this project defined two (2) primary objectives for this project: analyze the existing vehicular transportation conditions in order to determine the level of service (LOS) at the intersection and provide a design improvement if the LOS did not satisfy the standards expected by TDOT. Secondarily, pedestrian infrastructure and access was to be analyzed and

evaluated in a similar manner. Through comprehensive review and innovative design, this project aims to expedite the process of soliciting state and federal funding to better ensure the safety of all commuters.

Poster # 169

Phototherapy Delivery-System Design for In-Patient Rehabilitation

Elizabeth Evan Fortunato, Jacob S Dixon, Kelsey Bratten Henderson
Student's Department: Biosystems Engr/Soil Science Faculty Mentor: Yoder, Daniel

Bright-light therapy or phototherapy stimulates the release of dopamine and serotonin, making it a useful medical tool. A trauma unit at St. Rita's Hospital in Lima, Ohio uses daily phototherapy to encourage patients to complete physical therapy. The hospital has seen a dramatic improvement in recovery rates; however, the devices are underused because of limited table space on which to set up the devices. Hospital staff spends an excessive amount of time rearranging patients' belongings in order to set up the awkward devices. A mounting system was developed using two separate mounts for the major treatment locations, which allows for faster, more efficient device set-up. A table mount suspends the device over the table, allowing patients to use the entire table surface. A wall mount allows treatment to be easily administered in the bed without taking up valuable floor space. The connection between the device and the mounts allows for quick installation, and built-in electrical outlets solve problems involving cord length and outlet availability. Lux testing shows patients receive the same dose of lux they were receiving without the mounting system, and the staff at St. Rita's found the system to be a time-saving improvement to the previous treatment method.

Poster # 219

Dynamic Mechanical Characterization of Microscale Fibers and Thin Films

Darren Foster
Student's Department: Mech/Aerospace/Biomed Engr Faculty Mentor: Penumadu, Dayakar

As one-dimensional (fiber based) materials become more innovative and specialized with advancing technology and manufacturing techniques, the need to accurately characterize their mechanical properties is a key challenge. To study how these materials perform and respond to various external stresses, it is vital to test them using suitable mechanical testing systems. The Material Testing System Nano Bionix Universal Testing Machine (UTM) is a testing apparatus used for such characterization and has unique capabilities necessary to test small diameter fibers. The UTM can determine stress, strain, storage, and loss modulus using a Nano-Mechanical Actuating Transducer (NMAT). NMAT that allows the system to determine dynamic properties through nanoscale oscillations, similar to how a Dynamic Mechanical Analysis operates, that are superimposed on a tensile test. Thus, the UTM performs quasi-static loading or compression tests and applies nanoscale oscillations in a single test. Combined with a nanoscale displacement drive, the UTM attains precise stress-strain data for determining mechanical properties of micron scale fibers. This research focuses on utilizing this system for obtaining precise mechanical properties of carbon fibers to obtain structure-process-property relationships as part of the characterization group within the Materials and Processing group of the Institute for Advanced Composites Manufacturing Innovation institute (IACMI).

Poster # 332

Epoxy Nanocomposites with Reduced Flamability Derived From Magnesium Hydroxide-Melamine Polyphosphate Hybrids

Alexandra Maria Galaska
Student's Department: Chemical Engineering Faculty Mentor: Guo, Zhanhu

Blank Emailed her 3/14/17 Epoxy resin is one of the most important and applicable thermosetting resins that is lightweight and used in a wide range of applications with high mechanical properties, and chemical resistance. However, pure epoxy has high flammability, which is one of the major concerns challenging the real life application. Flame retardants can decrease the fire hazard and make epoxy more suitable for the desired products. In this research, two flame retardants are used to reduce the flammability of epoxy. Magnesium hydroxide as an inorganic flame retardant has been used in epoxy matrix rarely, while melamine polyphosphate is an effective phosphorus-based flame retardant

commonly used in the industry, including in epoxy, and other resins. This study investigates the effects of flame retardant on polymer nanocomposites and comparison of pure epoxy and its nanocomposites through micro-combustion calorimetry (MCC), tensile test, differential scanning calorimetry, x-ray diffraction, and scanning electron microscopy (SEM) studies. In this paper, the test results show that the nanofillers are dispersed very well in epoxy resin and the thermal stability and flame retardant properties of polymer nanocomposites with different loadings of nanofillers are enhanced compared with pure epoxy.

Poster # 235

Design of a Subcritical Fast Neutron Source for UTNE

James Michael Ghawaly

Student's Department: Nuclear Engineering Faculty Mentor: Hines, Wes

A subcritical, fast-neutron multiplying reactor was designed for the UTNE Class of 2017 senior design project. The reactor is intended to be placed in the new UTNE building and will be used for cross-section measurements, fast-reactor concept testing, materials testing, and other similar research. The current design of the fast neutron source consists of three primary parts: a D-D fusion neutron generator, the uranium fuel, and the lead coolant. The D-D fusion generator acts as a source of 2.5 MeV neutrons, which are then multiplied through fission reactions within the uranium fuel. The uranium fuel rods and other instrumentation will be placed in a matrix of lead blocks that act as coolant and shielding against gamma-rays and other forms of ionizing radiation. This project consisted primarily of the development and testing of software models of the proposed design. Using the results of these models, a preliminary design for the physical, material, and safety requirements of this project are presented.

Poster # 180

Modifying the Pitzer Method to Calculate the Equilibrium Constant of Yttrium for Solvent Extraction

Natasha Ghezawi

Student's Department: Chemical Engineering Faculty Mentor: Counce, Robert

With the demand for rare earth elements (REE) continually on the rise, improved methods of solvent extraction are necessary. Among additional REE, yttrium has been recovered from phosphate process byproduct streams via solvent extraction using a cation exchange extractant. This research employed experimental and modeling methods to calculate the equilibrium constant of the reaction. For the experimental portion, solvent extraction was performed using a single stage mixer-settler. The aqueous phase consisted of yttrium chloride in hydrochloric acid (HCl) whereas the recycled organic phase consisted of bis(2-ethylhexyl) hydrogen phosphate (HDEHP) in kerosene. Samples were analyzed for ion concentration in each phase at steady state. For the modeling portion, the Pitzer method was adapted to the 3-1 electrolyte system studied. The resulting equations were programmed to compute the aqueous phase activity coefficients using MATLAB®. Assuming an organic correction factor of 1, plots of the equilibrium constant versus concentration and aqueous phase activity coefficient were produced. The organic phase correction factor was adjusted until the plots produced a linear trend. The final model allows the user to optimize the concentration of extractant for economical extraction of yttrium.

Poster # 181

Charge Transport and Dynamics of Confined Polymerized Ionic Liquids

Kaitlin Elizabeth Glynn, Katherine Marie Yolitz

Student's Department: Chemical and Biomolecular Engr Faculty Mentor: Sangoro, Joshua

Broadband dielectric spectroscopy and Fourier Transform Infrared spectroscopy were employed to investigate charge transport and dynamics in imidazolium-based polymerized ionic liquids confined within nanoporous silica membranes. The influence of pore size and pore-wall interactions on the long-range ionic conductivity are investigated. The results are discussed within the framework of current understanding of confinement effects in polymerized ionic liquids.

Poster # 202

Automated Double Pulse Test System for Switching Loss Characterization

Kyle Jackson Goodrick

Student's Department: Electrical Engineering Faculty Mentor: Costinett, Daniel

Reducing power loss is one of the most import factors in power electronics design. A reduction in power loss allows for the design of converters that are more efficient or that are smaller and lighter. These improved converters can lead to longer range electric vehicles or more portable solar power. In high density power converters, switching losses account for a significant amount of the overall converter power loss and it is therefore desirable to minimize these losses. The double pulse test is a widely-used method to evaluate the switching losses of a power transistor. However, this experimental approach requires significant effort if many devices are to be considered for the converter design. This paper will discuss the process of automating the double pulse test. Automation allows for more rapid device characterization, opening doors to more accurate and widespread design of power converters.

Poster # 193

Wastewater Treatment Improvements for Rush Strong Elementary School

Kelli Michelle Grissom, Amie Katherine Gipson, Sharon Louisa Counts, Christina Rose Sanford

Student's Department: Civil and Environmental Engr Faculty Mentor: Retherford, Jenny

In 2000, Rush Strong Elementary School implemented a recirculating sand filter to treat their low-flow wastewater effluent. The existing wastewater treatment system was producing effluent that did not meet the regulations of Tennessee Department of Environment and Conservation (TDEC). Jefferson County School System requested that the Rocky Top Water Solutions design team create a design that would bring the school into compliance with TDEC regulations in a cost-effective manner. In order to satisfy this request, the team developed multiple alternative designs. These designs consider the client's preferences and employ a multi-criteria decision matrix that was used to evaluate the alternatives based on three criteria categories derived from a triple bottom line sustainability analysis: cost, operation and maintenance, and efficient technologies. This analysis yielded a recommendation of a 100% recirculation rate during low flows to account for weekends and holidays where there is no influent flowing into the system. It was also recommended to add a modification filter layout so that the laterals can be continuously cleaned, and no clogging will occur. Utilizing this design, it is believed that the school's effluent will comply with state regulations and that the system will work in an efficient manner.

Poster # 205

Pilot/ Flying J Truck Driver Staffing Optimization

Kevin R Gunckel, Grant James Powell, Matthew R Currey, Benjamin Cole Pollack

Student's Department: Industrial Engineering Faculty Mentor: Jin, Mingzhou

This project seeks to create software for a trucking business to optimize driver scheduling relative to daily demand. The software uses integer-programming modeling which traditionally works well when given definite constraints like "drivers may not work more than 12 hours at a time", but does not preform well when given constraints such as "drivers prefer not to work on weekends." The unique component of this model is that the model optimizes schedules while simultaneously taking into account human factors concerns. Drivers are subject to concrete TDOT and Company regulations, but the model analyzes human factor concerns through the use of "Discomfort points" a way of describing driver discomfort. Discomfort point optimization produces more ideal schedules for the company.

Poster # 236

Characterization of Surrogate Alloys for Special Nuclear Material Forensic Applications

Joshua James Gurka

Student's Department: Nuclear Engineering Faculty Mentor: Auxier II, John

Rapid and reliable analysis of interdicted special nuclear materials (SNM) is an ongoing effort and a major need for government agencies both domestic and abroad. Upon interdiction, the questions that arise regarding SNM of interest include; what were the possible casting procedures, how long since it was last cast, and where did it come from? There is currently not a comprehensive database of signatures for pre-detonation metals. Plutonium is stabilized

in its weaponized delta phase by alloying it with materials such as aluminum or gallium. This alloy exhibits a characteristic time signature in the form of grain-boundary diffusion which, can be exploited for forensics purposes. Along with the movement of impurity atoms, SNM undergo predominantly alpha particle decay, which will create defect regions inside the material. The defect sites will increase as the samples ages from its last processing time, and will change the electrical conductivity of the measurements. Therefore, sensitive conductivity measurements have been performed on pure metals and alloys. The change in conductivity observed will allow for the identification of the age of the materials. These techniques can be combined with traditional techniques, such as mass spectrometry, to allow for the development of forensic signatures that can then be related to the age and processing history of the material. Due to the inaccessibility of SNM, a proper surrogate is essential to extensively characterize pre-detonation metals.

Poster # 237

Study of temperature effect on cation inversion in MgAl2O4 and NiAl2O4 spinel using neutron total scattering.

Igor Maximovich Gussev

Student's Department: Nuclear Engineering Faculty Mentor: Lang, Maik

Spinel compounds (general formula A2+B3+2O2-4) are complex oxide minerals forming in Earth's mantle under high temperatures and pressures. The spinel structure is rather complex, being cubic close packed with multiple cation sites. In ordered ("normal") spinel, cations with higher valence, such as Al3+, typically occupy octahedral sites, whereas lower valence cations, such as Mg2+, ions occupy tetrahedral sites. In disordered spinel ("inverse"), tetrahedral sites are instead occupied by higher valence B3+ cations and octahedral sites have shared occupancy between A2+ and B3+ cations. This presentation shows neutron total scattering results on the temperature-induced order-disorder transformation of magnesium and nickel spinel analyzed by means of "small-box" modelling of pair-distribution functions. The originally ordered magnesium spinel undergoes significant changes in the degree of inversion above a threshold temperature, while nearly fully inverse nickel spinel maintains its level of inversion even at temperatures close to 1000 ℃. The data reveal that the traditional approach of modelling disordered spinel as cubic close packed structure is insufficient at the very local range (1.5 to 10 Å); instead a new tetragonal structural model is proposed to model inverse spinel more accurately.

Poster # 172

Structural performance of composite patches under low-velocity impact loading

Hannah Hajdik

Student's Department: Mech/Aerospace/Biomed Engr Faculty Mentor: TerMaath, Stephanie

Composite patches are often used for the repair and reinforcement on damaged metal structures such as ships and offshore structures due to their strength, versatility, and ability to stop crack propagation but are prone to further damage, usually in the form of dropped objects or other low-velocity impact. Damage properties of metals are well known, but composites and composites bonded to metals are more unpredictable. Because of this, it is important to evaluate the damage done to the metal and its composite patch in the event of further impact. Finite element analysis is cheaper and faster than experimental setups for all possibilities and accurate when validated, so numerical simulations of patched and unpatched thick and thin aluminum plates were conducted using the finite element analysis software Abaqus 6.14 and validated with experimental data. The energy absorbed by the plate and maximum deflection of the center were recorded to discover the behavior of the composite patch and the underlying metal. Sensitivity studies were also carried out to estimate the effects of different properties on the damage.

Poster # 209

Weldability of Al0.1CoCrFeNi High Entropy Alloy

Cameron Russell Hale, John William Bohling, William C Hoskins

Student's Department: Material Science/Engineering Faculty Mentor: Lundin, Carl

This project investigated the weldability of a High Entropy Alloy, specifically Al0.1CoCrFeNi (2.4 at% Al, 24.4 at% Co,Cr,Fe,Ni). High Entropy Alloys are candidate materials for next-generation power plants due to their high corrosion resistance and creep strength. Two HEA test weldments were fabricated by gas tungsten arc welding (GTAW) with dissimilar filler metals and were evaluated by bend testing, optical microscopy, and microhardness. Heat treatment at 850°C for 1000 h was performed to evaluate microstructural stability. Weldability was further evaluated using Gleeble

hot ductility testing. Bend testing showed no evidence of welding defects and optical metallography at the weld interface did not show a visible heat-affected zone (HAZ). After aging at 850°C for 1000 h, the weldment showed a hardness reduction of 20-50HV across the weld deposit and base metal, but no change in microstructure was apparent. The hot ductility behavior showed excellent recovery of on-cooling ductility after exposure to the nil ductility temperature (determined to be 1385°C), indicating that this alloy is insensitive to HAZ hot cracking. Considering the excellent hot ductility behavior and absence of welding defects or unusual microstructural characteristics, the Al0.1CoCrFeNi HEA alloy was found to have good weldability with minimal problems anticipated in fabrication.

Poster # 210

Friction Hydro Pillar Processing of Graphitized Carbon Steel Components

William C Hoskins

Student's Department: Material Science/Engineering Faculty Mentor: Lundin, Carl

Carbon steels are susceptible to graphitization when subjected to long term exposure at or above 800oF. Graphitization, the decomposition of metastable iron carbide (Fe3C) to iron and graphite, is an issue that has plagued the steam power and petrochemical industries. Therefore, a method to evaluate graphitization severity without component removal from service is desirable. In collaboration with Nelson Mandela Metropolitan University, an investigation of the effectiveness of the WeldCore® process in the determination of the extent of graphitization in carbon steel components was undertaken. The WeldCore® process involves two steps: (1) extraction of a core for metallographic examination and (2) in-situ repair welding by Friction Hydro Pillar Processing (FHPP). This process was completed on graphitized carbon steel steam pipes removed from service after 17 years at 800oF. The FHPP welds exhibited 100% bonding and passed a bend test. Microstructural evaluation revealed the formation of complex constituents in the FHPP weld heat-affected zone near pre-existing graphite nodules. The performance of the FHPP welded graphitized components was assessed by creep testing Jumbo-sized specimens. Based on microstructural evaluation, bend testing, and creep testing, the WeldCore® Technology was proven an effective method for the determination of the extent of graphitization in carbon steel components.

Poster # 238

Quantification of Uncertainty in the Determination of Crack Growth Properties Determined from Compact Tension Testing

Emily Hutchins

Student's Department: Nuclear Engineering Faculty Mentor: TerMaath, Stephanie

The widespread use of composite patches is to repair and reinforce cracked structures in naval ships, aircraft, automobiles, and many other metallic structures. In order to design and optimize the patch's ability to arrest crack growth in the metal, the fracture properties of the metal itself must be understood. Therefore, the interaction between different geometric and material properties and how they affect the crack growth of 5456 Aluminum Alloy is studied. This knowledge will improve the design of composite patches for optimized performance. Specifically, the objective of this research is to quantify the effects of uncertain material and geometric parameters on the critical energy release rate of 5456 aluminum alloy. Compact tension testing and calculations were performed in accordance with ASTM Standard e1820. Computational models were developed and validated using experimental test results. A sensitivity study was then performed using computational simulation to evaluate the most influential variables that feed into the critical energy release rate. The results from this project will provide critical data needed to optimize composite patch repair of cracked 5456 aluminum alloy.

Poster # 178

A.D.A.M.

Dillan Lee Jackson, Kolby Taylor Poteet, Matthew James Poland

Student's Department: Agricultural/Biosytems Engr Faculty Mentor: Wilkerson, John

As the world's population continues to grow, methods to accommodate the growing demand for crops must become more efficient. One method in increasing crop efficiency is determining where stress is seen in a crop field and taking steps to address said stress. Current methods of determining which areas of the crop field are under stress include the use of drones. The problem with using drones is that they do not give a good representation of temporal

data. Their capabilities of data collections are more limited to instantaneous representations of data collection, which could lead to misrepresentations. Along with this, drones that are capable of significant payloads are not only expensive, but also energy inefficient due to their need to expend large amounts of energy just to stay aloft. Eliminating the need for power usage to maintain elevation is what would make the system more efficient. Our design implements a helium filled balloon to address this issue, which allows us to conserve power as well as hover over areas easily for longer periods of time. Our system must cover 20 acres, withstand 20 mph wind, cost 75% less than current drones, and stay aloft for 24 hrs.

Poster # 194

Development of Experimental Database of Steel-Concrete Composite Columns

Morgan Jenkins

Student's Department: Civil and Environmental Engr Faculty Mentor: Denavit, Mark

Steel-concrete composite columns are an attractive alternative to more traditional structural steel or reinforced concrete columns for use within buildings and other structures. The two most common types of composite column are the concrete-filled steel tube, which is a hollow steel section with concrete inside, and the steel reinforced concrete member, which is a I-shaped steel section encased in concrete. Design provisions for composite columns are given in the AISC Specification for Structural Steel Buildings. These provisions have evolved significantly in recent editions, but further improvements are necessary to fully realize the benefits that composite columns provide. Two areas in particular where the provisions could be improved are the definition of the resistance factor for combined axial compression and bending moment and expansion of the scope to include higher strength materials. However, any change to the provisions must be well justified. In this research, a database of published experimental data is developed to aid in the development of new provisions and provide the basis of their justification. In addition to the raw data, each specimen is analyzed to evaluate current design provisions. Among the results is statistical data that describes level of uncertainty in the model when calculating expected strength, which is a key component in determining an appropriate resistance factor.

Poster # 211

Discovery of New Ternary Compounds and Scintillators of the A4BX6 Family

Jesse Ashby Johnson

Student's Department: Material Science/Engineering Faculty Mentor: Melcher, Chuck

Scintillators are functional materials that convert ionizing radiation into pulses of visible light, and are fundamental in applications for medical imaging and radioisotope identification for homeland security. Exploration of new compounds is sought to find new high performance scintillators, and we report the discovery of the compounds Cs4SrI6, Cs3RbSrI6, Cs3KSrI6, and Cs3KCaI6 grown as single crystals from the melt via the Bridgman method. Initially Cs4SrI6 was discovered and it was found to have high light yield and good energy resolution, the measure of a good scintillator. We used single crystal diffraction to determine the crystal structure as the trigonal K4CdCl6 structure type, space group $R\bar{3}c$. To improve scintillation properties, we focused on the crystal structure, and determined substitution of a single smaller monovalent cation would stabilize the matrix. We determined via powder X-ray diffraction that the structure of Cs3KSrI6 and Cs3KCaI6 changed, however Cs3RbSrI6 maintained the structure of Cs4SrI6.

Poster # 174

Object Manipulation in a Brain-Machine Interface Robotic Platform

Justin Robert Kilmarx

Student's Department: Mech/Aerospace/Biomed Engr Faculty Mentor: Zhao, Xiaopeng

Brain-Machine Interface systems (BMIs) are systems that can provide the pathways from the brain to external devices. The patient will be able to control the external devices in a desired way compatible with his/her intention. This sort of interaction can be beneficial in many fields, especially for amputees and paralysis patients. Here, we developed a BMI platform which is integrated with a 6 DOF Robotic arm. Movements of this robotic arm are controlled by brain signals through an imagined body kinematics paradigm. Brain wave data is collected with a low cost EEG headset with 14 channels. Decisions for robotic arm movements are visualized in real time by a cursor control task. For instance, if the subject wanted to move the arm to the left they would imagine moving the cursor to hit the left target on the computer

monitor. This platform was successfully tested with a six-step control test where the subject was required to hit six targets in sequential order to perform a simple lift task. This task consisted of the arm starting in a vertical position, rotating to the left and grabbing an object, and rotating to the right to drop the object before returning to its original position. This project sets the stage for future developments in the field of BMI robotic platforms that can lead to more medical advances such as improved prosthetic limbs.

Poster # 220

Scintillation Properties of Lanthanum Bromide Co-Doped with Cerium and Cesium

Benjamin Richard Kinga

Student's Department: Material Science/Engineering Faculty Mentor: Melcher, Chuck

Inorganic scintillators are being used to address the demand of high-resolution radiation detectors by identifying and monitoring x-ray and gamma-ray sources. Currently these gamma-ray detectors are being utilized in homeland security to prevent threats of nuclear proliferation, as well as use in medical imaging in positron emission tomography (PET). Lanthanum Bromide is a relatively new scintillator that was discovered in 2001, with phenomenal energy resolution below 3% at 662keV, high light-output of 70,000 photons/MeV, and short decay time of <30 ns. In this study, we investigate the scintillation properties of small-diameter (5mm) Lanthanum Bromide co-doped with 5% Cerium and 0.1%, 0.25%, or 0.5% Cesium. In addition, we investigate the geometrical properties with regards to the scintillator crystallinity caused by the addition of Cesium into the crystal matrix. The crystals are grown with using the Bridgman-Stockbarger technique. We minimized cracking that can occur during growth by optimizing the furnace's thermal gradient through experimentally measuring its thermal profile. X-ray crystallography technique is used to determine the crystal structure, and a 137Cs source is exposed to the crystal to yield pulse-height spectra and emission spectra. Decay profiles of these co-doped crystals are also measured and analyzed by monitoring the material's light emission excited from a gamma-ray source.

Poster # 195

An Analysis of Cyclist Safety at Railroad Crossings

Anastasia Alexandrova Koumtcheva

Student's Department: Civil Engineering Faculty Mentor: Cherry, Chris

Cycling as a mode of transportation is vital to reducing traffic congestion and air pollution. However, underdeveloped infrastructure deters many Americans from choosing cycling for their commute. To increase cycling as a means of transportation requires that cyclists not only be accommodated with lanes, but also that cyclist safety is kept a priority. One bike path of interest has been the greenway running alongside Neyland Drive in Knoxville, Tennessee. This green way intersects with a railroad crossing. The deep tracks of the railroad have caused over 50 injuries in past years. To correct this and allow for safe cycling, the city of Knoxville has worked alongside the University of Tennessee's Civil Engineering department to provide a denoted path and signs proceeding the rail road crossing. The denoted path has been added to the shoulder of East bound Neyland Drive and indicates the best angle at which to ride over the rail tracks so the bicycle wheels do not get entangled. The signs offer clear indication of the hazard posed by the railroad and allow a cyclist time to prepare. Current Undergrad Research involves studying cycling traffic over the railroad crossing to ensure that all precautions are effective.

Poster # 182

Make Scents? Engineering Bacteria to Make Natural Scents from Chemical Waste

Matthew R Kubis, Brandon A Wilbanks, Taylor Marie Weiskittel, Neel Jayantibhai Patel, Katherine Lynne Krouse

Student's Department: Chemical and Biomolecular Engr Faculty Mentor: Trinh, Cong

Aromatic aldehydes have a wide range of useful applications, from flavors and fragrances to pharmaceutical precursors and plastic additives. A large majority of these aldehydes are produced at low yield and over toxic catalysts. This gives rise to the need to produce these molecules in a renewable, environmentally friendly, and high-yield manner. Our project aims to meet these goals by developing a synthetic biology route to generate a library of aromatic aldehydes from their respective inexpensive toluene-based precursors that are an environmentally toxic waste in crude oil processing. We utilize the xyl ortho pathway of Pseudomonas putida, which is cloned into Escherichia coli as a host platform. This pathway converts toluene derivatives with a wide range of functional groups in the meta and para

positions on the ring to their corresponding aromatic aldehydes, leaving the meta and para substituents unaltered and therefore allowing for development of a library of products.

Poster # 183

Computer Simulations of Protein Aggregation in Minimal Membrane Models

Annabel Li Large

Student's Department: Chemical and Biomolecular Engr Faculty Mentor: Abel, Steven

Lipid rafts are thought to be small regions in the cell's plasma membrane that are rich in sterols and sphingolipids. These domains are theorized to impact a wide range of cellular activities involving protein clustering, although observing them in vivo has proven to be challenging. Computational modeling provides a means to investigate how interactions between lipids and proteins in these regions influence spatial organization. Here, the interactions are investigated using an Ising Model with three components: proteins and two different types of lipids. Monte Carlo computer simulations are used to characterize equilibrium distributions of the molecules at different temperatures and interaction energies. The resulting configurations and membrane energies have been used to construct visual representations, estimate the critical temperature below which phase separation occurs, and find trends in protein cluster sizes. The ultimate goal of this work is to explore how physical interactions between components affect protein clustering. Although there is broad consensus that the membrane is spatially heterogeneous, the existence of lipid rafts is an extremely controversial topic within molecular biology. Computational models can provide valuable insights into the nature of these features and further the understanding of the mechanisms behind critical cellular functions like signal transduction and apoptosis.

Poster # 196

Interfacial Shear Strength of Carbon Fiber Composites

Sean Patrick Lee

Student's Department: Civil Engineering Faculty Mentor: Penumadu, Dayakar

Strength, dependability, and durability are key factors to be considered when developing fiber reinforced composite materials for use in construction, the automotive production, and other similar industries. However, interfacial shear strength (how well the fiber adheres to other materials), is also of paramount importance. If a carbon fiber sample is paired with an epoxy (matrix), the individual strengths of each component are obviously important, but the qualities of the area between the two, the interphase, is also vital as stress is transferred from the matrix to the fiber and back again via the interphase. Because of the interphase's importance to the quality of fiber reinforced composite materials, testing this aspect of any fiber reinforced composite is crucial. The single fiber fragmentation testing (SFFT) method involves tensioning a single fiber composite under a polarized light microscope to locate breaks along the fiber. SFFT paired with formulated data analysis techniques yields a quantifiable result which measures the strength of the interphase. This research focuses on utilizing this technique for obtaining precise mechanical properties of carbon fiber interphase as part of the characterization group within the Materials and Processing group of the Institute for Advanced Composites Manufacturing Innovation (IACMI).

Poster # 212

The Applications of Atomic Structure Modeling Software in Predicting the Placement of Atoms in Scintillator Crystal Structure.

Alyssa M Lindsey

Student's Department: Material Science/Engineering Faculty Mentor: Melcher, Chuck

A material's behavior is a direct result of its atomic structure. Prediction of these structures is most accurate in crystals, as they are the most consistent in repetitive unit cell formation. The introduction of dopants into these crystal structures causes an irregularity in structure due to the random placement of the dopant. In order to further understand and predict dopant placement in scintillator crystals, the following three-part experimental procedure was developed. For part 1, the chemical formula of a crystal was input into Crystal Maker, a 3D modeling software, to produce a theoretical prediction of atomic structure. During part 2, pellets of the modeled crystal were created and the composition was verified through the use of x-ray diffraction. In part 3, the data obtained from part 2 was input into the modeling software to produce an experimentally-based structure model. The theoretical and experimental models were

compared with the goal of identifying the differences between predicted and actual crystal structure. The process was developed and calibrated using the well-known YAG crystal structure. It is hoped that the analysis performed will provide further insight into the placement of dopants in scintillator crystal structures.

Poster # 239

Scintillation Properties of KSr2I5:Eu2+ Crystals with Various Co-Dopants

Kevin Lee Mcdonald

Student's Department: Nuclear Engineering Faculty Mentor: Melcher, Chuck

The scintillation properties of KSr2I5:Eu2+ crystals have been found to be well suited for radiation detection and gamma ray spectroscopy. In this study, we added low concentrations of Na, Cs, and Li to KSr2I5:Eu2+ in an attempt to optimize its scintillation performance. The compounds were grown using the vertical Bridgman method, which involves melting the component elements into a mixture, sealing it into an evacuated quartz ampule and gradually lowering it through a temperature gradient until the mixture has solidified into a single crystal. The crystals were cut into 5mm thick cylindrical samples using a wire saw and were polished until each sample was free of surface defects. Characterization was conducted using Cs-137 radiation sources to excite the crystal and a photomultiplier tube to convert the emitted light into a voltage pulse. A pre-amplifier and amplifier were connected together to shape the voltage pulse into a signal which was recorded by a multichannel analyzer. The signals were then compiled into a gamma energy spectrum that was analyzed to calculate the scintillation performance of the sample, prioritizing energy resolution and light yield. This data will allow us to focus on optimizing the concentration of the co-dopants which most improve the performance of KSr2I5:Eu2+.

Poster # 173

Mode I Fracture Behavior of Bisphenol-A Epoxy Resin

Gillian Suzanne McGlothin

Student's Department: Mechanical and Aerospace Engr Faculty Mentor: TerMaath, Stephanie

As part of a research initiative funded by the US Navy, the Computational Mechanics and Structures group at UT is working to increase its understanding of the behaviors of composite patches that are currently being used in ship and plane repair. These composite patches are comprised of a metal base layer and a more flexible resin layer. Currently, a detailed, physics based model is being developed to better understand each of the contributing pieces of the patch as well as the bond line between the layers of different materials. This model is presently lacking thorough data on the characteristics of the Bisphenol-A (BPA) epoxy resin layer. This research project specifically serves to develop this part of the model by testing the BPA epoxy resin to obtain its Mode I fracture behaviors. The critical energy release rate, as well as other characteristic material properties, will be calculated from data obtained through tension and compact-tension testing. Understanding the fracture behaviors of these pieces is crucial in understanding the larger behaviors of the composite patches.

Poster # 197

Particle Fracture and Color

Jeremy Lee Melton, Chelsey Ann Brummer

Student's Department: Civil and Environmental Engr Faculty Mentor: Alshibli, Khalid

Sand particle fracture is influenced by several physical and chemical properties of the particle. Discovering the effects that material properties have on the behavior of sand is vital to the engineering behavior of sand. This research is focused on particle failure of mason sand. One property worthy of inspection is particle color. The intent of these tests was to assert that a direct correlation exists between particle color and the strength of the particle. Color is indicative of chemical composition of the particle, an important mechanical property of sand. The sand tested was mason sand from Colorado, which was chosen primarily for its heterogenic properties, including color and mineralogy. The sand was divided into four color categories: red/pink, clear/translucent, black/brown, and white/tan. The particles were submitted to unconfined uni-axial compression at a load rate of 0.02 mm/min. The load cell was capable of loading of up to 25 pounds (111 N). Data was collected for both load and displacement of the particle. Displacement was measured by a differential variable reluctance transducer. Test results showed that particle color and mineralogy do directly correlate to strength. Although variances existed, particles of similar size in the same color group behaved uniformly.

Group strength in ascending order was white/tan, black/brown, pink/red, and clear/translucent.

Poster # 175

Fabricated Scaffold for Efficient Three-Dimensional Cell Culture

Anna Morgan Mills

Student's Department: Biomedical Engineering Faculty Mentor: Ripp, Steven

Two-dimensional (2D) cell culture is traditionally used for toxicological and biological screening assays, but 3D cell culture has emerged as an improved high-throughput screening and drug discovery alternative. 3D culture systems more closely model native cellular environments, resulting in physiological behaviors that better resemble those in vivo, which in turn improves screening. However, the space required for 3D cell culture formats often exceeds the capacity of multi-well plate formats, limiting the use of 3D culture in high-throughput screening. Therefore, the need exists for a highly compact, higher cell density 3D culture model that can interface directly with current detection devices. In collaboration with Oak Ridge National Laboratory, we set out to design and fabricate a nano-to-micro scale 3D culture scaffold with the following requirements: can be replicated at high density in a comparatively small footprint (2 cm x 2 cm) and have a design that supports culture of human stem cells. These cells are autobioluminescent, meaning they produce light with no external requirement, and were shown previously to improve toxicity screening sensitivity. Together, this research will yield a novel, high density 3D culture platform that leverages autobioluminescent stem cells and somatic derivatives for toxicological and biological screening.

Poster # 201

A Neuromorphic System on Chip for Control System Applications

John Parker Mitchell

Student's Department: Electrical Engr & Computer Sci Faculty Mentor: Dean, Mark

Moore's Law is dead. With the rise of cloud computing and mobile devices, the total data across the world is growing at a staggering rate, and conven- tional architectures will struggle to keep up. Neuromorphic Computing is an alternative computing paradigm which leverages concepts from biology to create intelligent and highly e cient systems. As an emerging technology, there are limited implementations available today. DANNA (Dynamic Adaptive Neural Network Arrays) is a digital Neuromorphic architecture developed at the University of Tennessee. Currently, operating DANNA requires a workstation connected over USB to an FPGA using a standardized packet scheme. This project takes DANNA and integrates it into a SoC (System on Chip) design on a single FPGA board which is appropriate for battery powered control applications like mobile autonomous robots. This enables real world demonstrations of Neuromorphic applications and direct interfacing with sensors and actuators. This system was designed for a robot named NeoN which uses DANNA along with LIDAR to intelligently navigate around obstacles in a room, but the design generalizes to a wide range of usage cases.

Poster # 240

The Molten Salt iso-Breeder Reactor: Resurrecting and Refining the ORNL-4528 MSBR

Dallas M Moser, Devon L Drey, Igor Maximovich Gussev, Martha A Shields, Hsun Jui Chang

Student's Department: Nuclear Engineering Faculty Mentor: Chvala, Ondrej

The Molten Salt iso-Breeder Reactor (MSiBR) is an EPRI funded senior design project based on the ORNL-4528 molten salt breeder reactor design that uses modern computational tools and up-to-date nuclear data libraries to model and analyze the neutronics, reprocessing, and thermohydraulics of the reactor. The MSiBR aims to more effectively solve two major nuclear energy issues, engineered safety and spent fuel accumulation. These problems are addressed in this molten salt reactor design by using a two-fluid integral thorium fuel cycle consisting of a 7 LiF-BeF 2 -UF 4 fuel salt and 7 LiF-BeF 2 -ThF 4 blanket salt. This configuration allows for fuel to breed in the reactor with much less waste than with traditional designs while maintaining the inherent safety features typical of molten salt reactors. The design takes into consideration the cost to manufacture, sustain, and maintain the reactor and all its major core components. By designing the reactor to be iso-breeding, meaning to have a conversion ratio of one, less reprocessing equipment is required, and a lower operating cost is achieved. An economic model is created evaluating the impact the MSiBR would have on a simple power grid, and comparing its performance to renewable energy sources.

Leaching of Rare Earth Elements from Phosphogypsum using H2SO4 Poster # 184

Ryan Moser

Student's Department: Chemical and Biomolecular Engr Faculty Mentor: Counce, Robert

The strategic need for the production of rare earth elements (REEs) is the motivation of this study to recover REEs from a waste stream (phosphogypsum) produced from the manufacturing of H3PO4. The initial concentration of REEs in the solid phosphogypsum is approximately 194 ppm and the leach solution was 5 wt% sulfuric acid in water. The study was carried out in a stirred tank at ambient temperature and pressure. The comparison of the experimental data with zero-, first- and second-order models based on the concentration of the REEs in the phosphogypsum indicates that the first-order model provided the best fit of the data. Experiments were done (1) in a batch mode with the above initial phosphogypsum and liquid composition, (2) with repeated contact of the phosphogypsum with fresh leach solution at the above composition and configuration (3) in a counter current mode of operation with the input phosphogypsum and leachate composition of above. In all cases the first-order kinetic model represented the experimental data very well. Kinetic results from this study was then used with an economic model to study the estimated capital cost as a function of space time and number of stages. Acknowledgement: The experimental data used in this study is provided by Dr. Patrick Zhang of the Florida Industrial and Phosphate Research Institute in Bartow Florida. Funding is provided by the Critical Materials Institute, an Energy Innovation Hub funded by the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Advanced Manufacturing Office.

Poster # 241

Preliminary Design for an Isothermal Gas Chromatography Apparatus for Inorganic Chlorides

Austin Mullen

Student's Department: Nuclear Engineering Faculty Mentor: Hall, Howard

The separation of Uranium fission products in a post-detonation scenario is instrumental in tracking the weapon to its place of origin, and thus is of great interest in the field of nuclear forensics and security. Current methods for separating the elemental constituents inside the detonation residue are slow, and increasing the speed of this process is instrumental. The gas-phase separation of these fission products is much faster than traditional methods, but previous procedures under study required attaching the elements in question to heavy organic ligands, which limited their accuracy and led to difficulties in their separation. The purpose of this current research is to develop the instrumentation and separation methodology for much lighter chloride compounds, which would greatly reduce the chemical processing time required to characterize the residue. No instrument designed with this purpose has yet been created, so the development of the apparatus is a non-trivial task. This poster focuses on the preliminary design of this chloride apparatus. The main challenges presented by this new separation methodology are addressed with plans on how the new instrument can overcome them. Additionally, lessons learned from the previous gas phase separations design that will be incorporated into the new instrument are mentioned. Finally, the future implementation of the design and its methodology is presented.

Poster # 170

Direct Metal Write Additive Manufacturing of Rare-Earth Modified Aluminum Alloys Using Electromagnetic Heating Systems

Max Lestat Neveau

Student's Department: Material Science/Engineering Faculty Mentor: Rios, Orlando

Structural direct-write additive-manufacturing is a layered filament based metal manufacturing technology wherein liquid material is deposited from a print head directly onto a print bed. After solidifying, the material retains an intended shape, bonding with a layer of the same material upon which it is deposited. Unlike conventional metals, this process has been enabled by the unique rheological properties of rare-earth modified aluminum alloys. The scalability of this process is proved using rheology of the alloy, creating a system capable of direct write additive manufacturing of metal parts at room temperature in air. Removing the requirement for large ovens and tailored atmospheres significantly increases the accessibility of metal additive manufacturing. The system can also be used to create large and small scale parts with faster build rates, due to more usable green parts, than traditional metal additive manufacturing methods.

Poster # 221

Characterization of Void Distribution in hand layup Composite Patches using Automated Processing of Microstructure Imaging

Tyler James Newsom
Student's Department: Mech/Aerospace/Biomed Engr Faculty Mentor: TerMaath, Stephanie

Voids in the resin are known to degrade the performance of composite materials which are in widespread use for the repair of metallic structures. Applications span marine, infrastructure, vehicle, and aircraft repair. One specific application of composite repair is on US Navy ships. During shipboard installation, composite patches are installed by hand layup, and it is hypothesized that this process creates more air voids than a typical manufacturing process. The objective of this research is to use tomography and nuclear imaging techniques to create 3D images of the composite material and then calculate the percentage of air voids in composites manufactured using the Navy installation procedure. Additionally, an automated method was created to locate the air voids and characterize the geometry (size and shape) of the voids. Previously, void characterization was performed by a manually intensive procedure that was subjective and prone to human error. The automated process was developed using MATLAB, which provides the capability to crop and control image processing through Fiji. The new process will enable rapid and more accurate characterization of voids in composite materials leading to a better understanding of material degradation due to air voids.

Poster # 242

Analysis of Synthetic Urban Nuclear Melt Glass

Cody A Nizinski
Student's Department: Nuclear Engineering Faculty Mentor: Hall, Howard Lewis

Post-detonation nuclear debris is formed as material surrounding the blast is fused in the heat of the fireball of an atomic blast. Due to limited quantities of declassified post-detonation debris available to the nuclear forensics community, a realistic surrogate debris is needed to develop better analysis techniques. Synthetic melt glass of urban environments is modeled and the elemental ratios are calculated from soil compositions, land use data, and vehicle contributions. The formula can be adapted to accurately replicate a variety of locations and scenarios. Melt glass produced in the laboratory is characterized by x-ray diffractometry and scanning electron microscopy. The surrogate debris is found to be similar to debris formed during the Trinity test and representative of the input matrix.

Poster # 243

Tungsten Isotope Analysis using Inductively Coupled Plasma Mass Spectroscopy for use in Nuclear Fusion Research

Jack James Nowotarski
Student's Department: Nuclear Engineering Faculty Mentor: Donovan, David

Tungsten (W) has been chosen as the primary material to be used in the extreme heat flux regions of the inner plasma facing wall (divertor) of the world's largest and most ambitious Magnetic Confinement Fusion Project, ITER. Tungsten was chosen largely for the material's high heat capacity, low sputtering yield and low tritium retention. The primary issue with W plasma facing materials (PFMs) is that plasma material interactions cause erosion of the W PFMs, which release W impurities into the plasma. The W impurities cause large radiative power loss, therefore it is crucial to understand the production and transport of W impurities to minimize power loss in the fusion plasma. The University of Tennessee's (UTK) Plasma Materials Research Group conducts collaborative research with the General Atomics DIII-D Program, Sandia National Laboratory (SNL) and Oak Ridge National Laboratory (ORNL) to study impurity transport within the DIII-D tokomak using a unique isotopic tracer method. DIII-D is one of the largest fusion experiments in the United States and recently performed a Metal Tile campaign, which included two toroidal tile arrays (5 cm wide) of W-coated, molybdenum inserts in the lower outer divertor with the remaining PFMS being carbon tiles. The inner ring was coated in Natural-W (with 26.5% W-182) and the outer ring was coated with 93% isotopically enriched W-182. The unique "isotopic fingerprints" for the W impurities released from each coating in a dominant Carbon PFM environment enables their use as tracer particles to be collected and distinguished at other locations to better understand impurity transport.

Poster # 244

Advanced Gas-Phase Separations of Organometallic Fission Products

Colton Jacob Oldham

Student's Department: Nuclear Engineering Faculty Mentor: Hall, Howard

The field of post-detonation nuclear forensics aims to characterize the design of a nuclear weapon after it detonates. The matrices of the debris contain signature traces that function as a fingerprint to the weapon itself. To successfully improve state-of-the-art analytical practices in post-detonation nuclear forensics, a new approach must demonstrate both improved accuracy and more timely results to be considered for implementation over current analytical methods. One of the most time-consuming aspects of technical nuclear forensic analysis is the chemical separation process. Therefore, it was deemed prudent to develop a more rapid approach to fission product separations of post-detonation debris samples. A gas chromatograph connected with an inductively-coupled plasma time-of-flight mass spectrometer, GC-ICP-TOF-MS, was developed to exploit the rapidity of gas-phase chemistry. Primary accomplishments in the development of this instrument are presented here. Much work was undertaken to overcome challenges in volatile organometallic sample preparation, kinetic and thermal continuity, and sample injection methodology. The solutions to these hurdles, as well as results from the instrument, are presented.

Poster # 185

Sintering and electrical property investigation of depleted Urania samples

Jessica Marie Ossyra

Student's Department: Material Science/Engineering Faculty Mentor: Meek, Thomas

U3O8 is an intermediate step in the refining stage of the nuclear fuel cycle. U3O8 is the highly kinetically and thermodynamically stable form of uranium formed from natural depleted uranium. Its stability and accessibility suggests U3O8 as a possible candidate for a variety of semi conductive and electrical applications. Applications include use as a direct conversion semiconductor-based neutron detector that could allow for lattice spacing identification in materials and the detection of radioactivity in the safeguarding of special nuclear materials and power plants. Samples of U3O8 pellets with a diameter varying from 0.43 inches with a thickness of 0.03 to 0.04 inches were sintered at 900^{o}C, 950^{o}C and 1000^{o}C for various durations and microstructure evaluated through characterization of the resulting grain size. Electrical resistivity measurements are also taken by the four-point probe method. This characterization will help to determine the role these factors play on the electrical properties of U3O8 and its feasibility as a material for a direct conversion semiconductor-based neutron detector.

Poster # 206

Advanced Catalyst Systems Assembly Process Improvement Project

Megan Peck Kristen Nicole Miranda, Kalese Marsal Howse, Sami W Hijer, Gerald L Thornton

Student's Department: Industrial/Systems Engineering Faculty Mentor: Jin, Mingzhou

Abstract not available

Poster # 186

Automation of Dielectric Spectra Analysis: Application of Big Data Techniques

Tyler David Pitney

Student's Department: Chemical Engineering Faculty Mentor: Sangoro , Joshua

Broadband dielectric spectroscopy is a powerful tool for studying dipolar relaxation and ion dynamics in a broad class of materials including liquids, polymers and nanocomposites. Using dielectric spectroscopy, the dynamics of a given system can be probed across a frequency window spanning over thirteen orders of magnitude with very precise temperature control in a wide temperature range. However, this technique generates large data sets, which presents difficulties in analyzing the spectra in an efficient and accurate manner. Igor Pro is a versatile data analysis and plotting program that incorporates built-in programming capabilities and extensibility through user-built modules to automate the analysis of large amounts of data. The present work focuses on issues specific to handling large dielectric data sets using Igor's native capabilities and the development of modular task-specific procedures to enhance the capability and efficiency of Igor to analyze big data sets.

Poster # 207

Applied Convolutional Neural Networks in Analysis of Brain Waves During Sleep

Grant Powell

Student's Department: Industrial Engineering Faculty Mentor: Shylo, Oleg

This project aims to take advantage of recent technological advances in wearable neuro-headsets to provide an objective, reliable, inexpensive and scalable approach to sleep assessment. The approach leverages neural network methodology to classify human brain waves during sleep into their respective stages (i.e., sleep stages 1-3 and REM). Sleep stage classification, a job formerly performed by trained professionals in sleep laboratories only, has recently been the subject of machine learning/data mining studies in which classification is performed through the detection of statistical features such as min, max, median, standard deviation, wave energy, etc. In contrast, this project proposes to use a convolutional neural network (CovNet) for a more holistic classification approach as CovNets allow for analyzing the structure of a wave across its entirety, as opposed to a more limited feature analysis of wave sections. Additionally, CovNets allow for shared learning of properties across a data set, working under the assumption that if a computation is useful at one point in the wave, it is useful across any point.

Poster # 245

Material Flow Controlled Molten Salt Reactor Depletion Calculations

Gavin Keith Ridley

Student's Department: Nuclear Engineering Faculty Mentor: Chvala, Ondrej

An object-oriented Python 2.7 suite is developed that enables analysis of molten salt reactor fuel composition over the course of an arbitrary depletion period utilizing the Monte-Carlo neutronics and depletion code Serpent 2 from VTT in Finland. Dynamic material flow adjustments control reactivity and oxidation potential of the fuel. An algorithm to calculate fuel addition rate necessary to maintain criticality was developed. A variety of reactor characteristics can be determined as functions of depletion, and several examples are given. Delayed neutron fraction, fuel consumption rate, and conversion ratio over depletion are presented for 300 MW(t) FLiBe, NaFKF, and NaFZrF converter reactor concepts.

Poster # 213

Investigating Activators for Potential Novel Scintillator LaI3

Daniel Joseph Rutstrom

Student's Department: Material Science/Engineering Faculty Mentor: Zhuravleva, Mariya

A study was conducted to search for an efficient activator for LaI3. The first set of dopants tested were Bi3+ and Sb3+. Currently, there has been no published work dedicated to experimentally growing and measuring LaI3:Bi3+ and LaI3:Sb3+ for scintillation properties. In addition to these compounds, Eu2+ was investigated as a dopant for a mixed halide composition of LaBr3-xIx. The mixed composition was explored with the intention of increasing the host bandgap to fit the 5d-4f electronic transition of Eu2+ within the bandgap. Motivation for this project was based on computational work done by Dangxin Wu et al., which utilizes DFT calculations to make predictions about promising activators for LaI3 [1]. Doping with various concentrations of Bi3+ and Sb3+ was attempted, however, incorporation of Bi3+ and Sb3+ into the LaI3 matrix could not be achieved due to boiling points of the dopant compounds being below the melting point of LaI3. This issue was avoided when doping with Eu2+. Whether or not the charge imbalance introduced when doping trivalent LaBr3-xIx with divalent Eu2+ will negatively impact scintillation properties must also be considered. For this reason, co-doping LaBr3-xIx with Eu2+ and Hf4+ is being investigated as well.

Poster # 214

Pixelated Study of KCaI3:Eu 0.5%

Noah Schaftlein

Student's Department: Material Science/Engineering Faculty Mentor: Melcher, Chuck

The purpose of this study is to understand the scintillation performance of KCaI3:Eu 0.5% as a function of increasing radial distance from the axis of the crystal, to complement previous studies of scintillation performance along the axial direction. When a europium dopant is introduced into the crystal's lattice structure this will cause stress when

the crystal melt undergoes cooling into a solid structure. These europium ions tend to segregate towards the tail side of crystal when melting, this because europium's ionic radius is much larger than potassium, calcium, and iodine. This study is to test how europium segregates radially, rather than axially. To achieve this a Ø 38mm x 38mm crystal was grown via the Bridgman growth method. A 10mm thick slab was cut off near the seed of the crystal, this piece was then processed into 5x5x10mm pixels, each of them having a reference position so coherency was not lost. Each pixel was introduced to a 662 keV 137Cs source to quantify energy resolution. Before each pixel was measured the electronics were measured against a standard NaI:Tl source to provide a baseline. These pixels were compared accepted values to of KCaI3:Eu 0.5% energy resolution and a heat map was generated to show the best performing pixels.

Poster # 198

City of Maryville Urban Connectivity

Claire Schmidt, Oliver Roehl Moore, Kaitlyn Paige Patterson, Jacob E Taylor, Clayton D Barron, Bobby Jackson Bell, Angus Simon Sutherland Wilson

Student's Department: Civil and Environmental Engr Faculty Mentor: Retherford, Jenny

The City of Maryville is seeking to improve its current system of urban connectivity. The focus of this project is addressing issues including greenway disconnection by adding new connections between key areas of interest, investigating existing highly travelled sidewalks for walkability and compliance with ADA and PROWAG standards, and pedestrian safety improvements. Investigation of pedestrian safety is required for this project in response to the greenway crossing over a four lane highway with a speed limit of 45 mph. Traffic approaching the crosswalk from the west are coming around a slight curve on Hwy 321 which causes drivers to have limited visibility of the crosswalk. Currently, there are crosswalk warning signs with flashing beacons to alert drivers of the crossing. However, drivers in the area are often uncertain of if they should stop or not. The purpose of investigating this crosswalk is to improve pedestrian safety while also eliminating driver uncertainty. In addition to improving greenway safety, our client has also asked that we address the connectivity of the greenway. The city has asked that we investigate possible connections between key areas of interest within our area of study. This would include connecting the current greenway to Maryville College and Blount Memorial Hospital located on Hwy 321 just before Tuckaleechee Pike.

Poster # 215

Sol-Gel Synthesis and Cation Doping of Ca12Al14O33 Nanocages

Sabrina Emerson, Amy Schwerzler

Student's Department: Material Science/Engineering Faculty Mentor: Rawn, Claudia

Mayenite (Ca12Al14O33) has a positively charged cage structure that has an occluded anion in one out of every six cages to charge balance. The occluded anions can be extracted from the structure under reducing conditions, injecting localized electrons into the cage, and changing the electrical properties from insulating to conducting. When the framework of the cage is doped with different transition metal cations, the electrical conductivity and degree of locality of the electrons are altered. In the case of Cu doping, Jahn-Tellar distortions cause the framework to collapse, connecting localized electrons and creating pathways within the structure. These pathways should increase the mobility of the variable range hopping conduction type observed in the undoped system, leading to a higher conductivity. Conductive mayenite exhibits optical transparency and finds applications as a transparent conductive oxide. In the synthesis of these materials, it is important to control grain size to limit light scattering off of grain boundaries. This research seeks to synthesize Cu-doped Ca12Al14O33 via the citrate sol-gel synthesis technique to reduce initial crystallite size as well as sintering temperature and times. We investigate the kinetics of the sol-gel synthesis and characterize the resultant crystallite sizes.

Poster # 203

Single carbon fiber interface testing

Matthew Walker Seals

Student's Department: Civil Engineering Faculty Mentor: Penumadu, Dayakar

There is a growing interest in carbon fiber reinforced composites (CFRC) due to its low weight, high strength, and low cost, particularly in aerospace and automotive industries. Understanding the Interfacial strength between fiber

and resin is becoming increasingly important to characterizing the mechanical behavior of CFRC. In this work, a custom load-frame with 250 pound-force load cell has been developed to load single fiber composites in tension to mechanical failure. A software interface using LABVIEW software has been developed to record and control critical mechanical testing parameters such as load, displacement rate, and frequency of data collection. The control hardware consist of National Instruments C-Rio FPGA and associated C-series modules connected to load frame. Additionally, the displacement of crosshead is controlled by means of an acme screw and stepper motor.

Poster # 176

A Data Analytics Approach for Optimization of Hernia Mesh for Ventral Hernia Repair Through the Identification of Patient Subpopulations and the Correlation of Patient Outcomes to Implant Material

Rachel Lynn Slappy
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Abstract not available

Poster # 199

Gas Driven Fracture During Gas Production Using 2D Hele-Shaw Cell

Jaideep Thota
Student's Department: Civil Engineering Faculty Mentor: Alshibli, Khalid

Methane gas hydrate is an emerging energy source with global reserves on the order of 500-10,000 Gt of carbon. Production of methane requires hydrate dissociation for its release from the hydrate bearing sediment. The objective of this study is to develop technical strategies for gas production by investigating fines migration, and gas driven fracture of methane hydrates. This study utilizes Hele-Shaw cell (HSC) which is a 2-D microfluidic cell that consists of two transparent plates bolted together to allow visualization of multiphase flow. HSC is filled with brine saturated mixtures of silica sand and fines with different types (Kaolinite and Montmorillonite) and different fractions by weight (2%-30%). CO2 gas is used instead of Methane for safety restrictions to simulate hydrate dissociation at different pressures (2kPa-10kPa). Displacement processes of the sediment and fine particles, fines clogging and gas driven fracture are monitored using real-time digital imaging with an HD camera as well as high resolution microscope. The expected outcomes of this study are to observe the most relevant factors behind fines clogging and gas driven fracture. Such understanding can be used to evaluate and produce efficient technologies based on geologic and geographic variants in methane hydrate sediments reserves.

Poster # 200

Great Smoky Mountains National Park Donation Box

Walker Daniel Trent, Giles Evan Rankin, Audrey Caroline Linn, Caleb Andrew Brownfield, Sam Medina, Jesse Ashby Johnson
Student's Department: Civil Engineering Faculty Mentor: Retherford, Jenny

The University of Tennessee-Knoxville's College of Engineering Senior Design group was tasked with designing an innovative Donation box for the Friends of the Great Smoky Mountains National Park group. This design needed to defend against several forms of vandalism experienced by the current donation boxes such as being broken into with cutting torches and fishing from the boxes. Inspiration was taken from prison wall structures, and the new box was designed to incorporate reinforced concrete and corrugated steel into the walls. The feasibility of the design was tested by creating a simple representative prototype wall structure. The strength of the wall structure was tested using impact testing. Additionally, the response of concrete to high temperature was tested by applying a blowtorch directly to bare concrete and to concrete with a corrugated aluminum form. These same structures were also tested for their resistance to drilling. The preliminary testing proved that concrete could withstand multiple impacts. It also provided valuable insight into how torches would likely affect the structure, which will guide future design decisions. Using the preliminary information gleaned from the research and testing, a final preliminary design was created. This design, after finalization, adjustments, and fabrication will be fully tested against the forms of vandalism experienced by the current design.

Poster # 187

Enabling Metabolic Pathway Selection via Growth Selection of Modular Cell

Brandon A Wilbanks

Student's Department: Chemical and Biomolecular Engr Faculty Mentor: Trinh, Cong

To produce a target chemical at high yields, titers, and productivities, various combinations of available genetic parts for expression system can result in a large number of microbial cell factories generated for characterization. This engineering approach will become laborious and expensive when developing optimal strains for production of a large space of biochemicals due to extensive screening. Modular cell design offers a promising solution for rapid generation of optimal microbial cell factories using plug-and-play production modules. Here, we validate the modular cell theory by demonstrating: i) tight coupling between the modular chassis cell and a production module, an heterologous ethanol pathway as a testbed, ii) selection of an optimal pyruvate decarboxylase (PDC) of the ethanol production module based on growth selection, iii) discovery of new function of a hypothetical PDC protein, iv) improvement of growth rate and ethanol production rate by evolving the modular chassis cell and PDCs, iv) selection of the most optimal PDC from a mixed culture of strains with varied PDCs, and vi) selection of an optimal ethanol pathway using a library of promoters with variable transcriptional strength. We envision that the modular cell design is a platform technology for rapid development of optimal microbial cell factories for combinatorial synthesis of biochemicals.

Poster # 177

Rapid high-throughput screening of dioxin-like aryl hydrocarbon receptor (AhR) agonists using an autobioluminescent yeast assay

Anna Lois Young

Student's Department: Biomedical Engineering Faculty Mentor: Ripp, Steven

The aryl hydrocarbon receptor (AhR) and AhR nuclear translocator (ARNT) complex is a crucial signaling component that regulates the expression of a diverse set of genes involved in the response to exposure to environmental xenobiotics including dioxin and dioxin-like compounds (DLCs). Perturbations of the AhR/ARNT signaling pathway upon DLC exposure have been linked to a variety of adverse health effects, including deficiencies in reproduction and development, disruption of the endocrine system, neurotoxicity, immunotoxicity, cancer, and metabolic diseases. Due to their extreme stability, ability to bioaccumulate, and substantial toxicological effects, it is critical to monitor and quickly detect DLCs and provide a rapid tier 1 toxicity evaluation for environmental security and public health risk assessment. Here we report the development of a high-throughput autobioluminescent yeast assay for rapid, cost-effective, and quantitative detection of DLCs and other AhR agonists. We have engineered an autobioluminescent Saccharomyces cerevisiae reporter strain expressing AhR, ARNT, and an autobioluminescent lux reporter cassette under the control of xenobiotic response elements (XREs). This bioreporter is capable of self-initiating its autobioluminescent signal output upon exposure to AhR agonists without cellular lysis or exogenous addition of a light-activating agent, thus allowing for continuous, real-time monitoring of test compounds throughout the full exposure period. We have validated this bioreporter against the potent AhR ligand 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in a high-throughput 96-well plate assay format, showing a sigmoidal dose-response relationship with a half maximal effective concentration (EC50) of approximately 1.1 × 10-9 M within 6 hours of exposure. The effect of alternative dioxin-like AhR agonists benzo-a-pyrene and polychlorinated biphenyl (PCB) congener 126 have also been tested using the autobioluminescent yeast assay, resulting in EC50 values of 5.4 × 10-7 M and 5.9 × 10-9 M, respectively. These results demonstrate that the autobioluminescent yeast assay provides a rapid and cost-effective means for toxicological profiling of dioxin-like AhR agonists in a high-throughput fashion.

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Goldman, Hayley	132	College of Nursing
Goodrick, Kyle Jackson	202	Tickle College of Engineering
Goodwin, Grace	132	College of Nursing
Gorman, Rachel	14	School of Art, College of Arts & Sciences
Gorrondona, Andrea M	50	College of Arts and Sciences
Gowder, Emily	26	College of Architecture and Design
Gowder, Emily	33	College of Architecture and Design
Grant, David Leighty	274	College of Arts and Sciences
Graves, Clint Garrison	64	College of Communication and Information
Gray, Alex Ring	8	School of Art, College of Arts & Sciences
Greenlee, Leanza	51	College of Arts and Sciences
Grimm, Matthew Johann	133	College of Nursing
Grissom, Kelli Michelle	193	Tickle College of Engineering
Grossman, Natalie	153	College of Nursing
Gunckel, Kevin R	205	Tickle College of Engineering
Gurka, Joshua James	236	Tickle College of Engineering

Gussev, Igor	240	Tickle College of Engineering
Gussev, Igor Maximovich	237	Tickle College of Engineering
Hajdik, Hannah	172	Tickle College of Engineering
Hale, Cameron Russell	209	Tickle College of Engineering
Hancock, Chelsea	167	College of Nursing
Hansen, Sam E	4	School of Art, College of Arts & Sciences
Hardesty, Sarah	143	College of Nursing
Harp, Nicholas Ross	52	College of Arts and Sciences
Harrell, Kelsey	262	College of Agricultural Sciences and Natural Resources
Harris, Denise Elizabeth	71	College of Social Work
Harris, Gillian P	134	College of Nursing
Harris, Taylor	122	College of Nursing
Harris, Taylor Marie	80	College of Education, Health, and Human Sciences
Hartman, Alexa	316	College of Arts and Sciences
Harvey, Alisa K	15	School of Art, College of Arts & Sciences
Henderson, Kelsey	169	Tickle College of Engineering
Herald, Matthew	227	Tickle College of Engineering
Hermanson, Kassandra Leigh	135	College of Nursing
Hijer, Sami	206	Tickle College of Engineering
Hill, Holly Keeble	72	College of Social Work
Hillstead, Kaitlyn	126	College of Nursing
Hirt, Laura Elizabeth	102	Haslam College of Business
Hoang, Michelle	259	College of Agricultural Sciences and Natural Resources
Hodge, Blake Aaron	314	College of Arts and Sciences
Holcomb, Hannah Ramsey	136	College of Nursing
Holden, Brett	255	College of Agricultural Sciences and Natural Resources
Holder, Sierra	25	College of Architecture and Design
Holt, Jeremiah Ray	275	College of Arts and Sciences
Holtzclaw, Marielle Lynn	137	College of Nursing
Hood, John	191	Tickle College of Engineering
Hoskins, William	209	Tickle College of Engineering
Hoskins, William	210	Tickle College of Engineering
House, Margaret Ellen Marie	28	College of Architecture and Design
Howse, Kalese	206	Tickle College of Engineering
Huddleston, John C	29	College of Architecture and Design
Hutchins, Emily	238	Tickle College of Engineering
Ignacio, Peter	43	College of Arts and Sciences
Incorvaia, Sydney	141	College of Nursing
Ivy, Timothy	147	College of Nursing
Jackson, Dillan Lee	178	Tickle College of Engineering
Jacobson, Melanie	56	College of Arts and Sciences
Jenkins, Morgan	194	Tickle College of Engineering
Jenna Marie Duerst	135	College of Nursing

Jenner, Elizabeth	120	College of Nursing
Johnson, Jesse	200	Tickle College of Engineering
Johnson, Jesse	211	Tickle College of Engineering
Johnson, Sarah Rebecca	295	College of Arts and Sciences
Johnson, Suzanne	155	College of Nursing
Jones, Caleb Lester	16	School of Art, College of Arts & Sciences
Jones, Lynsey D.	258	College of Agricultural Sciences and Natural Resources
Kilmarx, Justin Robert	174	Tickle College of Engineering
Kimbro, Scott	189	Tickle College of Engineering
King, Dallas Bailey	73	College of Social Work
King, Taylor Leighann	103	Haslam College of Business
Kinga, Benjamin Richard	220	Tickle College of Engineering
Knowles, Erika Rene	41	College of Arts and Sciences
Kocisko, Corey	128	College of Nursing
Koenig, Alexandra	146	College of Nursing
Koger, Halli	138	College of Nursing
Koumtcheva, Anastasia	195	Tickle College of Engineering
Kounlavong, Emily Southida	315	College of Arts and Sciences
Kouzov, Evelyn	131	College of Nursing
Koziol, Haley Ann	253	College of Agricultural Sciences and Natural Resources
Krouse, Katherine	182	Tickle College of Engineering
Kubis, Matthew R	182	Tickle College of Engineering
Kuribayashi, Shichie	52	College of Arts and Sciences
Lam, Haylie Rachel	276	College of Arts and Sciences
Lamon, Chad Carter	255	College of Agricultural Sciences and Natural Resources
Land, Robert	120	College of Nursing
Landenberger, Bradley Ross	104	Haslam College of Business
Lane, Camille	9	College of Architecture and Design
Lannom, Michael	293	College of Arts and Sciences
Lannom, Michael	329	College of Arts and Sciences
Large, Annabel Li	183	Tickle College of Engineering
Law, Helen	308	College of Arts and Sciences
Lawhorn, Kane Alec	296	College of Arts and Sciences
Lawson, Ann Marie	316	College of Arts and Sciences
Layton, Jessica Slade	261	College of Agricultural Sciences and Natural Resources
Lazar, Malerie R	139	College of Nursing
Lebovitz, Sarah Grace Grace	317	College of Arts and Sciences
Ledbetter, Hannah	167	College of Nursing
Ledbetter, Robert Paul	318	College of Arts and Sciences
Lee, Maygen	60	College of Arts and Sciences
Lee, Sean Patrick	196	Tickle College of Engineering
Leonard, Madison Kathleen	277, 278	College of Arts and Sciences
Lester, Taryn Drew	319	College of Arts and Sciences

Letsinger, Amanda Leigh	140	College of Nursing
Lett, Sadie	129	College of Nursing
Lewis, Chelsea Alia	141	College of Nursing
Lidwin, Michael Steven	30	College of Architecture and Design
Lindsey, Alyssa M	212	Tickle College of Engineering
Linn, Audrey	200	Tickle College of Engineering
List, Rachel	30	College of Architecture and Design
Lohman, Johanna Grace	53	College of Arts and Sciences
Looney, Olivia	163	College of Nursing
Love, Lauren	129	College of Nursing
Lovell, Lauren	121	College of Nursing
Luong, Hung Quoc	297	College of Arts and Sciences
Lutzak, Claire Liana Nicole	142	College of Nursing
Lynch, Andrew	252	College of Agricultural Sciences and Natural Resources
Lynn O'Rear, Jessie	140	College of Nursing
Mackenzie, Heather	128	College of Nursing
Mackle, Cameron	256	College of Agricultural Sciences and Natural Resources
Macrae, Caroline	137	College of Nursing
Maddux, Peyton	165	College of Nursing
Maness, Charis	301	College of Arts and Sciences
Martin, Fiona	54	College of Arts and Sciences
Martin, Luke Thomas	250	College of Agricultural Sciences and Natural Resources
Martinez, Jessica	265	College of Agricultural Sciences and Natural Resources
Masters, Katie Marie	320	College of Arts and Sciences
Maxie, Amanda Lynn	321	College of Arts and Sciences
Maxwell, Ellen	151	College of Nursing
Mccall, Sarah Douglas	143	College of Nursing
McCarty, Macy Belle	9	College of Architecture and Design
McCroskey, Thomas	132	College of Nursing
Mccullough, Mallory	151	College of Nursing
McDonald, Darielle	136	College of Nursing
Mcdonald, Kevin Lee	239	Tickle College of Engineering
McGlothin, Gillian Suzanne	173	Tickle College of Engineering
McHugh, Emily	141	College of Nursing
Mcinnis, Kathleen Ann	81	College of Education, Health, and Human Sciences
McIntyre, Briana Kymari	144	College of Nursing
McLain, Tucker P	105	Haslam College of Business
Mcmackin, Brenna	126	College of Nursing
Medina, Sam	200	Tickle College of Engineering
Melton, Jeremy Lee	197	Tickle College of Engineering
Meyer, Haleigh	130	College of Nursing
Midgette, Camron Grey	322	College of Arts and Sciences
Mihealsick, Sarah Ann	145	College of Nursing

Miles, Lindsey Estellan	146	College of Nursing
Miller, Adam Clay	106	Haslam College of Business
Miller, Chase Aaron	147	College of Nursing
Miller, Emily Jean	279	College of Arts and Sciences
Mills, Anna Morgan	175	Tickle College of Engineering
Miranda, Kristen	206	Tickle College of Engineering
Mitchell, Hannah Gabrielle	55	College of Arts and Sciences
Mitchell, John Parker	201	Tickle College of Engineering
Mobley, Mary Margaret	107	Haslam College of Business
Mohler, Lauren Scott	74	College of Social Work
Moore, David	330	College of Arts and Sciences
Moore, David	298	College of Arts and Sciences
Moore, Margaret Jane	5	School of Art, College of Arts & Sciences
Moore, Oliver	198	Tickle College of Engineering
Moser, Dallas M	240	Tickle College of Engineering
Moser, Ryan	184	Tickle College of Engineering
Mullen, Austin	241	Tickle College of Engineering
Murr, Thomas Ryan	17	School of Art, College of Arts & Sciences
Murray, Joshua	10	College of Architecture and Design
Myers, Caitlin Emily	11	College of Arts and Sciences
Myers, Casey	10	College of Architecture and Design
Myrick, Claire	52	College of Arts and Sciences
Nabors, Stephanie	149	College of Nursing
Nachtrab, Jarrod	218	Tickle College of Engineering
Nami, Layla Elizabeth	18	School of Art, College of Arts & Sciences
Nash, Darrian Ginae	280	College of Arts and Sciences
Nelius, Eric	225	Tickle College of Engineering
Nelson, Alexandra Adrianne	65	College of Communication and Information
Neuharth, Taylor	135	College of Nursing
Neveau, Max Lestat	170	Tickle College of Engineering
Newsom, Tyler James	221	Tickle College of Engineering
Newton, Rachel	140	College of Nursing
Nguyen, Thao Thi	281	College of Arts and Sciences
Nill Gomez, zabella Nicole	323	College of Arts and Sciences
Nizinski, Cody A	242	Tickle College of Engineering
Northcutt, Ashley Nicole	82	College of Education, Health, and Human Sciences
Nowotarski, Jack James	243	Tickle College of Engineering
Nunn, Clayton H	282	College of Arts and Sciences
Oldham, Colton Jacob	244	Tickle College of Engineering
Oltmann, Shana	324	College of Arts and Sciences
O'Malley, Brenna Brigid	83	College of Education, Health, and Human Sciences
Ortiz, Bianca	42	College of Arts and Sciences
Ossyra, Jessica Marie	185	Tickle College of Engineering

Ott, Elizabeth D	31	College of Architecture and Design
Ottinger, Sarah Louise	254	College of Agricultural Sciences and Natural Resources
Owens, Abigail Diana	84	College of Education, Health, and Human Sciences
Palacios, Francisco Javier	262	College of Agricultural Sciences and Natural Resources
Park, Ilkyu	283	College of Arts and Sciences
Parker, Jacob	252	College of Agricultural Sciences and Natural Resources
Partlow, Brock Holden	56	College of Arts and Sciences
Patel, Neel	182	Tickle College of Engineering
Patterson, Kaitlyn	198	Tickle College of Engineering
Patterson, Madison McKinsey	150	College of Nursing
Patterson, Tori	146	College of Nursing
Payne, Taylor	315	College of Arts and Sciences
Peck, Megan	206	Tickle College of Engineering
Pence, Megan Louise	85	College of Education, Health, and Human Sciences
Pepperman, Kathryn	108	Haslam College of Business
Perry, Preston David	284	College of Arts and Sciences
Petermann, Madison Anne	325	College of Arts and Sciences
Peters, Eric Stephen	109	Haslam College of Business
Peterson, Brian	132	College of Nursing
Petschulat, Jack	19	School of Art, College of Arts & Sciences
Phillips, Emma Jon	75	College of Social Work
Phillips, Hayley	301	College of Arts and Sciences
Phung, Quang	222	Tickle College of Engineering
Pike, Brianna	137	College of Nursing
Pirie, Abigail Elisabeth	151	College of Nursing
Pitney, Tyler David	186	Tickle College of Engineering
Pitt, Elisabeth	131	College of Nursing
Pittman, Whitney Lynn	86	College of Education, Health, and Human Sciences
Plese, Sierra Renee	20	School of Art, College of Arts & Sciences
Plese, Sierra Renee	21	School of Art, College of Arts & Sciences
Poarch, Sara	62	College of Arts and Sciences
Poland, Matthew	178	Tickle College of Engineering
Pollack, Benjamin	205	Tickle College of Engineering
Poppert, Rachel E	148	College of Nursing
Porter, Haley Noel	87	College of Education, Health, and Human Sciences
Poteet, Kolby	178	Tickle College of Engineering
Powell, Grant	207	Tickle College of Engineering
Powell, Grant	205	Tickle College of Engineering
Puckett, Dexter Lee	88	College of Education, Health, and Human Sciences
Puleo, Roxanne	315	College of Arts and Sciences
Qualls, Logan Michelle	299	College of Arts and Sciences
Quillin, David	152	College of Nursing
Raines, Hannah	127	College of Nursing

Ramsey, Kriston	49	College of Arts and Sciences
Rankin, Giles	200	Tickle College of Engineering
Ray, Mollie Elizabeth	153	College of Nursing
Reed, Jacob	222	Tickle College of Engineering
Reynolds, Mary Grace	63	College of Arts and Sciences
Rhea, Caroline A	154	College of Nursing
Rhodes, Courtney	143	College of Nursing
Richardson, Tori	289	College of Arts and Sciences
Ridley, Gavin Keith	245	Tickle College of Engineering
Roark, Sierra Snively	300	College of Arts and Sciences
Roberts, Gretchen Lorena	43	College of Arts and Sciences
Rosenfield, Malachi	191	Tickle College of Engineering
Ross, Carly	137	College of Nursing
Rozanski, Abigail Mary	110	Haslam College of Business
Rule, Madeline Marie	111	Haslam College of Business
Rutstrom, Daniel Joseph	213	Tickle College of Engineering
Salonga, Kirsten	44	College of Arts and Sciences
Salonga, Kirsten	301	College of Arts and Sciences
Salonga, Kirsten	302	College of Arts and Sciences
Samples, Beverly M	89	College of Education, Health, and Human Sciences
Sanabria-Sugarman, Valeria	144	College of Nursing
Sanders, Erika Nicole	285	College of Arts and Sciences
Sanford, Christina	193	Tickle College of Engineering
Sarisaltik, Damla	86	College of Education, Health, and Human Sciences
Satterfield, Katherine	156	College of Nursing
Schaftlein, Noah	214	Tickle College of Engineering
Schaltegger, Ethan	90	College of Education, Health, and Human Sciences
Schell, Robert	283	College of Arts and Sciences
Schmidt, Claire	198	Tickle College of Engineering
Schofield, Elizabeth R	112	Haslam College of Business
Schoondyke, Jeffrey	280	College of Arts and Sciences
Schwartz-Micheaux, Janet	43	College of Arts and Sciences
Schwerzler, Sabrina	215	Tickle College of Engineering
Scott, Katie Danielle	66	College of Communication and Information
Scott, Matthew Douglas	303	College of Arts and Sciences
Seal, Elizabeth	165	College of Nursing
Seals, Matthew Walker	203	Tickle College of Engineering
Seaman, Sara Elizabeth	113	Haslam College of Business
Seinfeld, Jason	218	Tickle College of Engineering
Sells, Shauna Lynn	155	College of Nursing
Sengaroun, Timothy	22	School of Art, College of Arts & Sciences
Shannon, Jerry	298	College of Arts and Sciences
Shannon, Jerry Clint	330	College of Arts and Sciences

Shaw, Casey	156	College of Nursing
Shaw, Michael	188	Tickle College of Engineering
Sheridan, Lucas Forrest	91	College of Education, Health, and Human Sciences
Shields, Martha	240	Tickle College of Engineering
Shult, Kate Richter	156	College of Nursing
Simmons, Jamie	163	College of Nursing
Skeen, Chesnea A	57	College of Arts and Sciences
Slappy, Rachel Lynn	176	Tickle College of Engineering
Smith, Adam	27	College of Architecture and Design
Smith, Chelsea V	157	College of Nursing
Smith, Christopher	171	Tickle College of Engineering
Smith, Harrison Taylor	114	Haslam College of Business
Smith, Shelby	171	Tickle College of Engineering
Smith, Starla Mikel	158	College of Nursing
Smith, Thomas	226	Tickle College of Engineering
Smith, Thomas	229	Tickle College of Engineering
Sonnenberg, Allison Morgan	32	College of Architecture and Design
Southerland, Aubrey Hope	58	College of Arts and Sciences
Sowell, Erica	156	College of Nursing
Sparks, Anna	188	Tickle College of Engineering
Spencer, Cole	151	College of Nursing
Spivey, Taylor Douglas	251	College of Agricultural Sciences and Natural Resources
Spooner, Cameron	13	School of Art, College of Arts & Sciences
Standifer, Cynthia Michele	92	College of Education, Health, and Human Sciences
Stanfield, Elizabeth Hope	59	College of Arts and Sciences
Stanley, Rachel Leeanne	76	College of Social Work
Stark, Phoebe Catherine	286	College of Arts and Sciences
Steichen, Samantha Nicole	115	Haslam College of Business
Steinmann, Jennifer	60	College of Arts and Sciences
Stephens, Elise Camille	6	School of Art, College of Arts & Sciences
Stidham, Abbigail	276	College of Arts and Sciences
Stone, Whitney Lynn	159	College of Nursing
Stovall, Christopher	65	College of Communication and Information
Sukienik, Avery N	287	College of Arts and Sciences
Swanson, Sierra Joan	304	College of Arts and Sciences
Swystun, Alex Taylor	305	College of Arts and Sciences
Tang, Fangyi	189	Tickle College of Engineering
Tannehill, Ashlee	323	College of Arts and Sciences
Tate, Tayler Amelia	116	Haslam College of Business
Taylor, Graham Colton	10	College of Architecture and Design
Taylor, Jacob	198	Tickle College of Engineering
Terry, Peyton	280	College of Arts and Sciences
Thornton, Gerald	206	Tickle College of Engineering

Thota, Jaideep	199	Tickle College of Engineering
Tieche, Taylor Elizabeth	306	College of Arts and Sciences
Toney, Kierra N	60	College of Arts and Sciences
Towe, Kelsey Brook	160	College of Nursing
Trent, Walker Daniel	200	Tickle College of Engineering
Troyer, Adaya Alexandra	161	College of Nursing
Tucker, Tawayne	155	College of Nursing
Turan, Josh	208	Tickle College of Engineering
Tyree, Laurel Kathryn	23	School of Art, College of Arts & Sciences
Ubben, Cameron	226	Tickle College of Engineering
Ubben, Cameron	229	Tickle College of Engineering
Untch, Michelle	247	College of Agricultural Sciences and Natural Resources
Van Balen, Rebecca	263	College of Agricultural Sciences and Natural Resources
Vance, Katherine	127	College of Nursing
Vanderford, Benjamin	148	College of Nursing
Vanmaaren, Victoria	43	College of Arts and Sciences
Vantrease, Morgan Brooke	162	College of Nursing
Varriano, Louis James	331	College of Arts and Sciences
Vuong, Richard	326	College of Arts and Sciences
Walker, Natalie	131	College of Nursing
Wallen, Zachary	189	Tickle College of Engineering
Wallen, Zane	226	Tickle College of Engineering
Wallen, Zane	229	Tickle College of Engineering
Ware, Carolyn R	288	College of Arts and Sciences
Ware, Sallie	124	College of Nursing
Waterson, Kelsey	39	College of Arts and Sciences
Watkins, Amy Marie	163	College of Nursing
Watts, Leslie	122	College of Nursing
Weiskittel, Taylor	182	Tickle College of Engineering
Weitzel, Chappel Spencer	256	College of Agricultural Sciences and Natural Resources
Welch, Brooke M	289	College of Arts and Sciences
West, Katherine	315	College of Arts and Sciences
Whitaker, Andrew	252	College of Agricultural Sciences and Natural Resources
White, William Wesley	45	College of Arts and Sciences
Whited, Lauren Ashley	164	College of Nursing
Wilbanks, Brandon	182	Tickle College of Engineering
Wilbanks, Brandon	187	Tickle College of Engineering
Wilder, Haley	289	College of Arts and Sciences
Williams, Cassandra	148	College of Nursing
Wilson, Angus	198	Tickle College of Engineering
Wilson, Jordan	136	College of Nursing
Wilson, Kathleen Krenson	165	College of Nursing
Windham, Ian Andrew	290	College of Arts and Sciences

Winfield, Jonathan William	33	College of Architecture and Design
Winstead, Rachel	305	College of Arts and Sciences
Wood, Makenna Breann	34	College of Architecture and Design
Wood, Robert Seth	307	College of Arts and Sciences
Woods, Lauren	142	College of Nursing
Wright, Kaitlyn	289	College of Arts and Sciences
Wright, Matthew Stephen	117	Haslam College of Business
Yates, Simone	39	College of Arts and Sciences
Yoder, Hannah G	166	College of Nursing
Yolitz, Katherine	181	Tickle College of Engineering
York, Sydney Mackane	167	College of Nursing
Young, Anna Lois	177	Tickle College of Engineering
Young, Jonathan Andrew	7	School of Art, College of Arts & Sciences
Yuan, Lian Jye	24	School of Art, College of Arts & Sciences
Zaouk, Rani Hani	118	Haslam College of Business