UNDERGRADUATE RESEARCH & POSTER SYMPOSIUM

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ABSTRACTS

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Undergraduate Research & Poster Symposium 2015

Student Abstracts

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College of Agriculture

Poster Number 1: Devon Barbot

"Starch and Hydrocolloid Interactions"

In this project we are observing the swelling power and starch leeching of native and crosslinked cornstarch in various hydrocolloid solutions. We would like to determine if there is a significant impact on the thermal treatment of the crosslinked starches compared to the native starch and how the hydrocolloid solutions affect that.

Poster Number 2: Jess Bunchek

"Impact of Emergence Date on the Growth of Five Waterhemp Biotypes"

Waterhemp (Amaranthus tuberculatus var. rudis) exhibits sporadic germination which can influence biomass accumulation and plant height. As waterhemp continues to spread across the United States, it is important to understand how varying waterhemp biotypes fare in different geographic areas. This knowledge will help determine better control regiments for this weed species. In a 2014 summer field experiment, waterhemp from Illinois, Indiana, Iowa, Missouri, and Nebraska were originated in the greenhouse and then transplanted into a common garden at 3 different timings. Seeds were first planted in the greenhouse on May 12, June 12, and July 12. Roughly 2 weeks after planting, the pots were directly transplanted to the field at the Throckmorton Purdue Agricultural Center (TPAC). Once each plot was thinned to 30 plants, plant heights were taken every subsequent week. The male-to-female ratio for each plot was also recorded once flowering was complete. The results showed that significant differences did exist between populations within the planting dates for plant height, growth rate, and biomass accumulation. The results also showed significant decreases in biomass accumulation and plant height as the planting date progressed throughout the season. Despite these decreases, all planting dates yielded mature seed from all 5

biotypes, informing us that waterhemp has the ability to reproduce across the entire growing season.

Poster Number 3: Amy Burbrink

"Agrimarketing Practices- A Qualitative Exploration"

Little extant research has considered the formality with which different types of agribusiness firms develop marketing strategy. A qualitative approach was used to explore the marketing strategies of six firms. The firms' marketing mixes, environmental factors, and targeted segments were compared using two qualitative approaches: transcendental phenomenology and conversation analysis. The results of this project suggest that future research should examine whether better metrics to define marketing success can be identified, and whether firms tend to adopt more formal marketing approaches to strategy development as they grow.

Poster Number 4: Rebecca Busse

"Understanding Effective Outreach for Water Quality in the Upper Tippecanoe Watershed of Indiana"

Effective outreach is essential for the conservation of aquatic resources. In order to create effective outreach, we must understand the public's perception of water quality, and the perceived barriers to implementing environmental solutions. In 2010, Purdue University sent a survey to the lake residents of the Upper Tippecanoe Watershed, Indiana. The survey asked citizens questions about themselves, their property, their perception of water quality, and their usage of conservation practices. In 2014, Purdue sent another survey, similar to the one sent in 2010, except this survey also asked questions regarding attendance and perception of specific outreach that had been conducted by the Tippecanoe Watershed Foundation. Survey results showed that more respondents were

currently using targeted conservation practices in 2014 than in 2010. Also, more respondents were aware of those conservation practices in 2014 than in 2010. Survey results suggest that outreach efforts should provide more information and instructions for implementing conservation practices. Also, because respondents found different barriers to each conservation practice, local conservation groups should create programs and outreach materials that address each practice individually.

Poster Number 5: Alan Clinton

"Lasthenia Microsatellite Discovery"

Understanding the genetic relationships between populations provides important insights into strategies for the conservation and management of endangered taxa. Microsatellite markers provide a useful and cost-effective tool for quantifying the extent and distribution of neutral genetic variation in species, but they their highly variable nature causes them to typically be species-specific and thus must be designed de novo for taxa of conservation concern. Using whole-genome sequencing, we discovered numerous polymorphic microsatellites within the herbaceous plant species Lasthenia fremontii, which is very closely related to two federally-listed endangered species in California. The goal of this project is to identify markers that can be transferred from L. fremontii to these relatives to contribute to the conservation of these species. Initially, we discovered hundreds of microsatellites in L. fremontii using Genome Microsatellite Analyzing Tool (GMATO) to analyze genomic sequences obtained from a single Lasthenia fremontii individual sequenced using single lane Illumina run. Next, we tested twelve of these microsatellites in L. fremontii to test if they can be successfully amplified in the species in which they were discovered, and in L. burkei and L. conjugens to test if the markers can be transferred to the closely related endangered species. Nine of the twelve (75%) of the microsatellites successfully amplified in L. fremontii. Of these nine markers, four successfully amplified in both endangered species, two amplified in L. burkei but not L. conjugens, two amplified in L. congujens but not L. burkei, and one did not amplify in either endangered species. Thus, we found that ~67% of the microsatellite markers that

successfully amplify sequences in L. fremontii could be transferred to each of the closely related endangered species, but only 44% of these transferred to both endangered taxa.

Poster Number 6: Colleen Cottrell

"Fortification of Corn Tortillas by the means of Asian carp Fish Protein Hydrolysates"

Invasive silver carp (Hypophthalmicthys molitrix) is a major concern in the Mississippi river system. Despite having high protein content, these fish are underutilized as they are not very popular with North American consumers. Fish protein hydrolysates (FPH) are classified as soluble by-products obtained from proteolytic hydrolysis of crude fish proteins. FPH have been widely used as means of better utilizing fishery by-products through the use of proteolytic enzymes to produce a wide range of functional peptides that can be used as food ingredients. / Corn tortillas, a staple in some Latin American diets, lack essential amino acids lysine and tryptophan and as a result, populations that rely on this staple food can suffer from protein malnutrition. The aim of this study was to use FPH from invasive silver carp as fortifying ingredients in corn tortillas. / FPH were hydrolyzed with Protomex (3% enzyme substrate ratio) for 90 min. Ten corn tortillas formulations were prepared based on varying amounts of FPH (0 -10%) and salt (0 – 1%) content. In comparison to the control (no fortification), the protein content of the tortillas increased between 0.5% (0.5% FPH, 0.504% salt) and 8.84% (10% FPH, 0.504% salt) [dry basis]. Total lysine content on FPH was 10.0 g/100 g protein. Preliminary sensory evaluation results showed no significant difference ($p<0.05$) in preference between the ten tortilla formulations (n=22). /

Poster Number 7: Debby Devina

"Quality Comparison of Pop-Tarts heated with a radiant fryer, a toaster, and unheated"

Breakfast is an essential factor that affects human performance and learning development. To start the day, carbohydrates and proteins play an important role as energy sources. In addition, high carbohydrate foods, such as pastries, are

digested much faster than foods that are high in grains and proteins, such as toasts and eggs. Therefore, they help people to get the necessary energy to do work readily. Pop-Tarts, breakfast pastries that are popular in the American diet, are considered high fat foods because they have 17-26% of crude fat, depend on their filling, frosting, and ingredients used. A Radiant fryer is an alternative heating method that is proven to successfully reduce the fat content in fried chicken by 16%, can potentially also reduce the fat content in Pop-Tarts which will make them healthier products. The goal of this project is to examine the ability of the radiant fryer to reheat Pop-Tarts. The objective of this project is to compare the crust thickness, oil content, moisture content, core temperature, surface temperature, surface color, and texture of unheated, radiant-fried, and toasted Pop-Tarts.

Poster Number 8: Katherine Dowell

"Twitch or Treat: The behavioral and physiologic reaction of horses to twitching"

This research examines the behavior and heart rate of horses in order to better understand the effects of twitching. This is a process in which the nose of the horse is pinched in order to immobilize the animal so that medical procedures can easily be performed. It is highly debated whether the act of twitching a horse is therapeutic or cruel and this research is the first step in investigate whether horses find the procedure aversive. Fifteen horses were selected for this experiment and randomly assigned to either a control or one of 2 treatment groups. The treatment involved twitching the horse for a period of three minutes for a total of 7 treatments. A second treatment group got the same amount of twitching but also received praise and petting along with the twitching. The control group was held for the same amount of time but not twitched. Instead they were given treats every thirty seconds. The first part of the research focused on assessing the behavior of each horse via collected video footage. Specific behaviors such as pawing at the ground or head jerking were recorded and quantified. In the second part of the experiment each horse's ECG was recorded continuously using Telvet software and then analyzed. The data collected shows

that twitching of these horses did not cause a negative association, and there was no increase in head throwing, avoiding the twitcher or any other aversive behaviors. No differences were found between the first and second treatment groups. Additionally, that heart rate consistently dropped during the twitching period. Together the findings indicate that horses appear to tolerate the twitching process and do not avoid the twitch after multiple exposures. The reason why the heart rate dropped with twitching is not known, and further research should be done in order to understand the phenomenon.

Poster Number 9: Katherine Farris

"P.G. 600 Analysis"

Administration for P.G. 600 helps reduce the number of non-productive days in sows by reducing the numbers of days from when a sow weans her piglets and when comes into heat to be rebred. Previous research in multiparous sows has shown that an intramuscular administration (IM) of P.G. 600 at weaning can reduce the wean to estrus interval (Knox et al., 2001). The objective of this project was to evaluate P.G. 600 administration to parity one sows at weaning using different routes of administrations and dosages subsequent reproductive outcomes. The recommended dose of P.G. 600 for parity one sows is 5cc administered IM. At weaning 215 parity one sows were assigned to one of the following three treatment groups: 5cc IM of P.G. 600(head=70), 3cc IM of P.G. 600(head=74) and 3cc of P.G. 600 SQ(head=72). Sows were checked for estrus following weaning and bred using artificial insemination when they were identified in estrus. Litter characteristics including number born alive, number of mummies and number of still-borns were recorded for each sow. General linear regression was used to analyze the data using SAS. The binary data of pregnancy rate was evaluated using the GLIMMIX number of piglets born alive, gestation length and all appropriate interactions. Treatment did not significantly affect number born alive, number of stillborns, number of mummies, or pregnancy rate. These results suggest that P.G. 600 could be administered to first parity sows at either 3cc SQ or 3cc IM to obtain similar results as the recommended dosage of 5cc IM.

Poster Number 10: Kathryn Graf

"Soybean Tolerance to Metribuzin and Sulfentrazone"

Sulfentrazone and metribuzin are two common soil residual herbicides used to manage glyphosate-resistant waterhemp and Palmer amaranth. However, soybean varieties have differential tolerance to these herbicides resulting in significant soybean injury. Our research objective was to evaluate two experimental methods in the greenhouse to determine the sensitivity of soybean varieties to metribuzin and sulfentrazone. The first method started with soybean seeds from multiple soybean varieties planted into a blend of field soil:sand:potting mix and herbicides were applied to the soil surface prior to soybean emergence. Evaluations of visual soybean injury and plant height were made every seven days until 21 days after emergence (DAE). Soybean shoot tissue was harvested at 21 DAE and dry weight determined. For the second experiment, soybean seeds and pre-germinated seedlings were soaked in four different concentrations of sulfentrazone and metribuzin for 24 hours. Seeds or seedlings were then planted in potting mix and evaluated for emergence rate, height, and visual injury every seven days for 14 days. The soil applied herbicide method allowed differentiation between susceptible and tolerant soybean varieties when sulfentrazone was applied at 0.14 kg ai/ha. However, further research is needed to identify optimal metribuzin rates for direct soil applications. Results for the seed imbibition experiment with sulfentrazone were inconsistent; while no injury was observed from imbibing seeds with any concentration of metribuzin. Successful screening and classification of soybean varieties as susceptible or tolerant to these herbicides will be the foundation for a genetic analysis to improve the development of future soybean varieties. /

Poster Number 11: Jacob Haury

"Effectiveness of Using High Voltage Atmospheric Cold Plasma for Microbial Reduction and Quality Maintenance of Cantaloupe"

There has been an increasing number of foodborne illnesses resulting from cantaloupe including Jensen Farms in Colorado during 2011 and Chamberlain

Farms in southern Indiana in 2012 combining for over 300 reported cases by the CDC (1, 2). There are currently no regulations for decontaminating cantaloupe, but rather just a set of voluntary guidelines (3). Current methods of sanitizing fresh cantaloupe include washing with chlorinated water or peroxyacetic acid. These treatments have shown slight reduction in total bacteria, but outbreaks are still occurring which exemplifies the need for improved methods to provide a safe, high quality product (4, 5). / / The purpose of this study is to measure the effectiveness of using High Voltage Atmospheric Cold Plasma (HVACP), as a means for sanitizing fresh store-bought cantaloupe. Dr. Kevin Keener, Professor at Purdue Food Science, has developed the HVACP system (patented technology) intended to reduce bacteria while increasing shelf-life by converting air or package gas into reactive bactericidal species such as ozone, nitrogen oxides, carbon monoxides, and peroxides (6, 7). / / Cross sections were cut from the top, bottom, and side of store-bought cantaloupes then sealed in a high barrier plastic bag filled with either compressed air or a modified blend (65% O_2, 30% CO_2, and 5% N_2). The slices were then subjected to indirect HVACP treatments at high-voltage/low-power (90Kv/200W) for 180 seconds creating over 5,000 ppm of Ozone, followed by a 24 hour storage at 4°C. / Results from aerobic plate count showed a reduction between 2-3 $\log_{10}$ using the HVACP, and preliminary results show minimal to no effects on texture or color on the surface of fresh, raw cantaloupes. Results show the HVACP can be an effective means of sanitizing fresh cantaloupe compared to the current methods. Current research indicates promise of scaling up the system for industrial use and the opportunity to treat several cantaloupe at once directly from the farm.

Poster Number 12: Charles Hegg

"Prediction of primal cut weights in pigs using a non-linear mixed procedure"

The objective of this trial was to model the relationships of carcass measurements and primal cut weights to carcass weight and estimate the residual variation. Data from 558 pigs (94.16 ± 7.6 kg of hot carcass weight, HCW) were collected at a pork processing plant. Hot carcass weight, loin depth (LD), backfat depth (BF) and percent lean (PL) were recorded for each pig during the slaughter process. Primal

cut belly, butt, picnic, sparerib, ham and loin weights were recorded for each carcass side. To linearize the allometric function (Y = AXB), natural logarithm to natural logarithm transformation was performed (LN Y = LN A + B LN X). To evaluate which combination of explanatory variables were best, different models were tested. For all cut weights, a model that included LNHCW, SIDE, SUPPLIER and LNHCW*SUPPLIER interaction was used, then LD and BF were added. A non-linear mixed procedure (SAS) was used to fit the model for cut weight which was: cut weight =A*(HCW)B + b1(BF -19.65) + b2(LD − 62.37) + (b3*SIDE). The effect of SIDE was significant for estimating sparerib, ham, picnic and loin weights (P < 0.001). Also LD was significant for the estimation of loin weight (P < 0.001). For belly and picnic cuts, SUPPLIER was significant (P < 0.05). Estimates for an equation to predict belly and picnic weights for each supplier were performed. Pork primal cut weights can be estimated using a non-linear mixed model. /

Poster Number 13: Matthew Hill, Varun Subramanyam

"Streamlining and automating genome-wide association studies (GWAS) in maize"

We developed a computational pipeline that semi-automates Genome-Wide Association Studies (GWAS) in maize. The maize Association Panel (AP), a collection of 282 maize inbred lines that cover 80% of genetic diversity in the species, has undergone many ancestral recombination events captured through SNP analysis often leading to single-gene resolution of trait loci. GWAS returns base-pair locations closely associated with the trait of interest. TASSEL, a program designed for maize by USDA scientists at Cornell (www.maizegenetics.net), is widely used by researchers for GWAS. However, users are required to have a working knowledge of a programming language, such as Perl, and perform manual or batch process gene searches and BLASTs. We designed a semi-automated pipeline that runs the GWAS; it requires only loading of trait data, and all other processes are automated and require no experience with genetics or bioinformatics by the user. We have also tested the various modes of TASSEL to optimize the analysis and removal of false positives. Application of the pipeline has streamlined our search for candidate genes within QTL contributing to lignin

abundance and enzymatic digestibility in two elite maize germplasm lines. While lignin composition and abundance is a major factor in recalcitrance of biomass to biofuel conversion, we found that enzymatic digestibility is not correlated with lignin content and can be impacted by genes not involved in lignin abundance. We are currently using the AP to find genes other than lignin that might remodel maize cell walls and make them more amenable to biofuel production. During the course of these studies we serendipitously discovered corn borer damage to be a quantitative trait within the AP, and we are using the GWAS pipeline to identify candidate resistance genes. / Supported by the Center for Direct Catalytic Conversion of Biomass to Biofuels (C3Bio), an Energy Frontiers Research Center funded by the U.S. Department of Energy, Offic

Poster Number 14: Ryan Louer

"Analysis of Mutations in the Conserved C-terminal Diglycine of SUMO Protein in Tetrahymena thermophila"

SUMOylation is a conserved posttranslational modification in eukaryotic organisms primarily regulating nuclear processes. Tetrahymena thermophila has a transcriptionally active macronucleus and non-transcribed micronucleus that undergoes mitotic and meiotic divisions. This separation of mitosis and gene expression provides a unique opportunity for the analysis of sumoylation. The objective of this study was to identify mutations in Tetrahymena SUMO that alter covalent attachment to target proteins. Mutations in the conserved C-terminal diglycine motif of SUMO were introduced using PCR. The mutant SUMO genes contain N-terminal 6-His and 3x FLAG tags and their expression is controlled by a cadmium dependent metallothionine promoter. Following ligation into pSBYFP2, plasmid DNA was isolated from E. coli and transformed into Tetrahymena via homologous recombination at the RPL 29 locus using cycloheximde selection. Western blot results indicate that deletion of the C-terminal glycine, the C-terminal diglycine or substitution of the C-terminal glycine residue for a serine residue all reduce the ability of SUMO to bind target proteins. Of these three SUMO mutants, the deletion of the diglycine motif was most deleterious to SUMO attachment. Tagged wild type SUMO mutant cell lines, both mature and

immature variants, serve as controls in immunoblotting and phenotypic studies. The data collected thus far are consistent with previous studies demonstrating the importance of diglycine motifs. These defective SUMO proteins can be used as negative controls for SUMO affinity purifications or examined for dominant negative phenotypes.

Poster Number 15: Christopher Mapes

"Studying the Effects of Silver Nanoparticles on Fish Embryo Development"

Because of the high bactericidal activity of silver nanoparticles (AgNPs) they are being incorporated in a variety of commercial products, including cosmetics, clothing, textiles, and detergents. However, many studies have shown that AgNPs are toxic to aquatic organisms. My study focused on evaluating the effects of polyvinylpyrrolidone-coated silver nanoparticles (PVP-AgNPs) (60 nm) on zebrafish (Danio rerio) embryo development. Zebrafish embryos (< 1 hour post fertilization, hpf) were exposed to 0, 0.1, 1, and 10 mg/L PVP-AgNPs for 96 hours. Endpoints included mortality, hatchability, heart beating rate and development, oxygen consumption, and body length. Effects included: Increased embryo mortality, decreased hatching rates, decreased heart rates, decline in oxygen consumption, decreased growth, and altered heart development (elongated ventricles) in the 1 and 10 mg/L PVP-AgNP groups. No effects were observed at the lowest dose tested. Overall, these results show that PVP-AgNPs are toxic to zebrafish embryos at concentrations ≥ 1 mg/L.

Poster Number 16: Elizabeth Milaitis, Dimitrius Guimaraes, Andrew Miller, Hanna Sauce, Donica Owsley, Jessica Viduya, Shiqi Yang

"Optimizing the Mapping of RNA-Sequencing Reads to Domestic and Companion Animal Genomes"

Current DNA sequencing technology has resulted in the production of draft genome sequences for many domestic and companion animals. Draft genomes contain numerous sequencing errors, gaps and assembly problems. Sequencing technology has also made comprehensive analysis of the transcriptome (all expressed RNA) possible. The prevalent genome-guided analysis of the

transcriptome is dependent on accurate alignment (mapping) of millions of short RNA sequences to these draft genomes. This ANSC514 class project used the Rosen Center for Advanced Computing Scholar Cluster and Tophat2 read mapping program to test three parameters on RNA-sequence mapping. Anchor length, mismatch, read gap length were titrated to determine their effect on overall read mapping rates and paired alignment rates for the genome assemblies of cattle, chickens, dogs, horses, pigs, sheep, mice and humans. The mismatch parameter had the greatest effect on alignments in all species and read gap length had only minor effects in most species. Anchor length had no effect on read mapping in any species. Although there are a number of additional parameters involved in accurate RNA-sequence read mapping, this analysis provides baseline data for researchers to optimize the mapping of their RNA-sequencing data.

Poster Number 17: Brian Rice

"Ralstonia Solan GWAS in Arabidopsis"

K60 is a particular stain of Ral. Solan, a pathogenic bacteria, native to North America. It causes bacteria wilt in tomatoes, as well as diseases in related plants, and is economically important with global loses in some crops estimated around $1 billion. This project is a genomic screen for resistance to K60 in 96 wild type lines of Arabidopsis because of its relatively short genome. The project will look specefically at root growth in response to inoculation. The outcome will hopefully be a gene or genomic region controlling for resistance to K60 in Arabidopsis. This information will be useful in learning more about plant resistance to this particular pathogen. Depending on the level of complexity of genetic control the same genes may be identifiable in other plants or used in genetic engineering.

Poster Number 18: Hilary Richards

"Effect of Crop and Soil Management Practices on Fruit Quality in Tomato"

Interest in Organic produce has become increasingly popular in the past decades. Many consumers prefer organic produce over conventional to avoid unnecessary exposure to chemicals such as pesticides and herbicides. Others prefer organic produce because they believe that organically grown produce provides a higher

nutritional quality of food. There have so far been few studies that compare soil nutrient density with nutrient density of the foods grown in them. In this study we wanted to look at the role that different management practices played in fruit quality of tomato. Four varieties of tomatoes were grown under conventional and organic management practices. Soil samples were taken at the beginning, middle, and end of the growing season. Plant health was also monitored during the growing season looking at height, width, and chlorophyll content of plants. At the end of the season harvest data was collected that including fruit number and weight as well as plant biomass. Carotenoid content and Citric acid content was also compared between varieties and management practices to look for differences in organically managed plants compared to conventional. Colony forming units in the soil were also monitored to look at the link between the soil microbiome and plant quality and health as this is also of great interest. Biolog ecoplates were used to determine evenness, diversity, and richness of the soil during the growing season. All of these factors together and more will give a clearer view of how soil nutrition plays a role in in food quality.

Poster Number 19: Benjamin Savage

"Use of plant volatiles to attract natural enemies of wood-boring insect pests of black walnut (Juglans nigra)"

Exotic bark and ambrosia beetles are serious pests of landscape, nursery, orchard and forest trees and among the most commonly intercepted insects at ports-of-entry in the United States. As international trade and travel increases, the number of introductions continues to rise at an alarming rate. These pests cause substantial environmental damage and economic loss. The long-term protection of the hardwood resource at risk to these destructive pests requires the integration of multiple tactics, including understanding and exploiting natural enemies that may regulate pest population densities. / We have recently performed laboratory bioassays to establish that adult walnut twig beetles (WTB), Pityophthorus juglandis (Coleoptera: Curculionidae: Scolytinae), are strongly attracted to and colonize girdled branches of black walnut. This species is an invasive pest of eastern black walnut and vectors a fungal pathogen that kills the

host tree. By comparing the volatile profiles of intact and girdled walnut branches, we identified four compounds (i.e., α-pinene, β-pinene, camphene and cymene) that are more highly represented in the volatile collections from girdled black walnut. We have also demonstrated that WTB are attracted to α-pinene and β-pinene in these bioassays, and we are currently evaluating the capacity of these four compounds, alone and in combination, to attract WTB in the field. Nevertheless, these volatile phytochemicals may also function as attractants for natural enemies (e.g., predators and parasitoids) of bark and ambrosia beetles. However, the extent to which these walnut-specific volatiles attract natural enemies of WTB and other wood-boring insects is unknown. The objective of this proposed work is to determine the extent to which these compounds, alone and in combination, attract known predators and natural enemies of bark and ambrosia beetles including WTB. This study will lead to improved management strategies for exotic beetles.

Poster Number 20: Kyle Schmidt

"The Impact of Bacteriophage Therapy on Gut Microbiome"

Phage therapy is the use of bacteriophages to treat bacterial infections. Bacteriophages are attractive as antibacterials as, unlike antibiotics, they may target specific pathogens without making global changes to the surrounding bacteria. Here we compared the impacts of orally administered phage therapy and antibiotic therapy on the gut microbiome. Piglets (n = 17; 3 weeks of age) were randomly assigned to one of three treatments: 1) ASP250 (chlortetracycline [10g/lb]; sulfamethazine [10g/lb]; penicillin [5g/lb]) administered in the feed; 2) Salmonella phage cocktail (administered by gavage); and 3) control (no antibiotics, no phage). All pigs were euthanized at 14 d. There were no significant differences in performance parameters (daily feed intake, ADG, WG) across treatments. Preliminary 16S sequencing analysis revealed that at 14 d, ileal contents of antibiotic treated pigs had higher percentages of Clostridia compared to phage treated pigs, however both antibiotic and phage treated pigs had higher percentages of Clostridia compared to control pigs. Likewise, cecal contents of pigs treated with phages had higher percentages of Lactobacilli

compared to both antibiotic and control pigs. Taken together, these data indicate that phage therapy may impact the gut microbiome, but those changes may be beneficial.

Poster Number 21: Allison Turner

"Understanding maintenance and diffusion of rain barrels"

Urbanization increases the volume of stormwater runoff from homes, businesses and other paved areas of the urbanized landscape. Unable to infiltrate into the ground, stormwater is directed to facilities that can easily become overloaded and cause water quality issues. This study aims to assess urban homeowners' motivations to adopt and maintain rain barrels—a best management practice (BMP) that reduces stormwater runoff—and to evaluate how this BMP diffuses throughout a community. This research took place in the Great Bend of the Wabash River (Lafayette-West Lafayette, Indiana) and Salt Creek (Valparaiso, Indiana) watersheds, and the thesis features site performance evaluations of 281 rain barrels and 31 in-person interviews. Overall, this assessment index and the comparison of data between the two watersheds will help organizations understand the barriers to proper rain barrel maintenance, enabling them to target their efforts and ensure the continued functioning of BMPs. / Our preliminary results suggest that rain barrel maintenance is related to time since adoption and the presence or absence of an informational sign at homes. The factors that made it most difficult for homeowners to maintain their barrel include issues with water pressure, equipment malfunction, and time required for maintenance. We also found that the great majority of rain barrel owners maintain a flower or vegetable garden and are involved with environmental groups or other initiatives. Outreach may need to focus more on the importance of proper maintenance of rain barrels as well as emphasizing the connection between rain barrels and personal gardening.

Poster Number 22: Seth Wannemuehler

"Characterization of Nodal Anatomy in Alternanthera ficiodea"

Stems of plants are composed of two different regions, nodes and internodes. Nodes are defined as sites of leaf attachment to the stem, and internodes comprise the regions between nodes. Vascular tissues in the stem diverge at the node to provide the vascular systems for leaves and branches. In addition, other anatomical differences may also occur between nodal and internodal regions. Nodal anatomy varies among plant taxa, but typically exhibits similar features in related species. In examining stems of Alternanthera ficoidea (Joseph's coat), an ornamental plant, we noticed an unusual pattern of nodal anatomy in which the bulk of vascular bundles in the stem diverge into the leaves as leaf traces and then regenerate above the node from only two remaining vascular bundles. In this study we have examined and compared nodes from the tip of the stem through early secondary growth below the tip to characterize features of nodal anatomy and its development from primary stem structure through initiation of secondary growth in the stem. We observed that vascular anatomy, as well as the position of hairs in the stem epidermis, rotated at each node in parallel with 90 degree rotation of leaf attachment to the stem. In addition, we observed that the number of leaf traces increased as the stem developed. Cells containing crystals of calcium oxalate accumulated at the nodes, but were sparse in internodal regions. In older regions of the stem distinct differences in secondary growth of the vascular tissues were observed above and below the nodes.

Poster Number 23: Bethany Weldon

"Role of the Circadian Clock in Growth of Mammary Epithelial Cells"

Role of the Circadian Clock in Growth of Mammary Epithelial Cells / / Authors: Bethany Weldon, Theresa Casey, Jennifer Crodian, Aridany Suarez Trujillo, Kristi Crow, Emily Erickson, Karen Plaut / / Milk production efficiency in dairy cattle can be altered by changes in photoperiod. These alterations are mediated by the circadian timing system, which is made up of molecular clocks located in every tissue of the body. How clocks mediate changes in production efficiency is

currently not understood. We hypothesize that mammary clocks regulate gland growth. Our objective was to determine if decreased expression of CLOCK, a component of molecular clocks, affects growth and regulation of the cell cycle in mammary epithelial cells (HC-11). Previous studies showed when HC-11 cells were transfected with shRNA sequences complimentary to CLOCK, mRNA expression was knocked-down, which resulted in significantly decreased abundance of CLOCK protein ($P<0.05$). Growth curve analysis showed cells transfected with shCLOCK had 6.75-fold higher growth rates ($P<0.05$) than wild-type HC-11 cells. shCLOCK transfected cultures also displayed 3.5-fold higher rates of cell death ($P<0.05$). Cell cycle analysis revealed, that on day 2, 43% of the shCLOCK cells were in S phase while less than 10% of the wild type HC11 cells were in S phase ($P<0.05$). Furthermore, cell cycle analysis of cultures collected every 4 h for a 48 h period revealed that patterns of cell cycle progression differed between shCLOCK transfected and wild type HC-11 cells ($P<0.05$). These studies indicate that when CLOCK levels are decreased in mammary epithelial cells, regulation of growth is affected. /

College of Education

Poster Number 24: Monerah Al-Dubayan

"Does Bilingualism Negatively Impact the Cognitive Abilities of Children with Autism Spectrum Disorder?"

Students with autism spectrum disorders (ASDs) from bilingual families are often advised to only speak one language (English) and refrain from speaking their native language. / According to three different studies conducted in the last five years, bilingually exposed children with ASD experienced no additional delays in their language development. Moreover, these children have the capacity to function successfully as bilinguals. The different studies used a variety of instruments and tests including the Peabody Picture Vocabulary Test-III, Preschool Language Scale, Mullen Scales of Early Learning, Communicative Development Inventories, and researcher-developed interviews. / Though the results of the reviewed research are promising, it is imperative that more research is conducted on this topic so speech-language pathologists, pediatricians, and other health officials can make treatment recommendations based on scientific evidence and help communities overcome misconceptions about bilingualism and ASD.

College of Engineering

Poster Number 25: Eric Acosta

"Effect of He+ Ion Irradiation on Zirconium Microstructures Under Extreme Conditions"

The safe and continued operation of the US nuclear power plants requires improvement of the radiation resistant properties of materials used in nuclear reactors. Zirconium is a material of particular interest due to its use in fuel cladding. Studies performed on other materials have shown that grain boundaries can play a significant role on the radiation resistant properties of a material. Thus, the focus of our research is to investigate the performance of various zirconium samples under extreme conditions (similar to those in commercial nuclear reactors). Analysis of the surface morphology of zirconium both pre- and post-irradiation was conducted with Scanning Electron Microscopy (SEM). Cold-rolled (small-grain microstructure) and annealed (large-grained microstructure) zirconium samples were mechanically polished in order to be irradiated. Room temperature irradiation of zirconium samples was conducted at energies of 100 eV and 1000 eV with He+ ions at a flux of 1x10^20 ion m-2 s-1 using a gridded ion source. High temperature (623 and 973K) He+ irradiations were performed with 100 eV He+ ions using a gridless end-hall ion source at the same flux. Transmission Electron Microscopy (TEM) was conducted to determine the grain size of the zirconium samples. Preliminary results show greater surface damage on the rolled zirconium samples than on the annealed samples for all irradiation cases. The difference in damage was most evident in high temperature irradiations. Further work is necessary to evaluate why the small-grain zirconium exhibited greater damage. Future testing will be performed using higher fluxes, temperatures and energies.

Poster Number 27: Jason Becker, Patrick Skrodzki

"Signal Enhancement in Long-Wavelength Double-Pulse LIBS for Bulk and Trace Analytes"

The mechanisms involved in signal enhancement and persistence of the plasma in double pulse LIBS (DPLIBS) are investigated as well as their implications to improving figures of merit for bulk and trace analytes in sample are discussed. For DP-LIBS, 1064 nm Nd:YAG laser is used for ablation and 10.6 μm TEA CO_2 laser in near collinear geometry is used for reheating. Significant improvement in signal detection and sensitivity of both bulk and trace analytes using DPLIBS as compared to conventional single pulse LIBS (SPLIBS) are observed. Using DPLIBS in near-collinear geometry, Cu and Fe as bulk and trace analytes respectively, in brass sample, showed 7 and 9 times improvement in signal to background ratio. Temporal and time integrated studies show that ionic lines are significantly enhanced compared to neutral lines. Plasma characterization employing spectroscopic methods showed significant enhancement in plasma temperature resulting in higher signal intensity as well as increased plasma persistence.

Poster Number 28: Francis Blubaugh

"Student Music Preference and Engineering Major Choice"

What role does music preference play in engineering students' major selection? Previous research has linked musical preference to personality and values, both of which correlate to social identity. Pierre Bourdieu's text, La Distinction, asserts that social class influences judgments of taste and choices in cultural activities. Thus, musical preference may be considered a proxy for diversity in the broad dimensions of experiences and social class. There are, however, few studies examining the role of music in the academic outcomes of postsecondary students. The goal of this study is to examine student music preference as a mediating factor in engineering students' major choice. / /   Empirical data include over 1,500 survey responses from freshman engineering students at a large research institution. The survey includes questions regarding the student's musical preferences. Methods include descriptive statistics and regression

analyses. Research findings will help to shed light on the diversity of engineering students, beyond more visible demographic factors, and how diversity in taste and musical preference may influence the composition of students in the different engineering disciplines. With the nation's call for more diverse engineering professionals, engaging music preference may provide a unique approach to broadening participation in engineering. / /

Poster Number 29: Nina Bragg

"Biomolecule Assisted Nanoparticle Self-assembly for Synthetic Nano-mechanical Systems"

Nanomaterials like single-wall carbon nanotubes (SWCNTs) and quantum dots (QDs) have been shown to exhibit superb electronic, optical, and mechanical properties. Functionalizing nanomaterials with biomolecules such as DNA or phospholipids combines the physiochemical properties of the nanomaterial with the recognition capabilities of the biomolecules. This study demonstrates biomolecule-assisted assembly of QDs onto the surface of SWCNTs. Various methods for non-covalent surface functionalization of SWCNTs and QDs was explored. DNA is cross-linked with pegylated phospholipids, which is then interacted with SWCNTs. The hydrophobic interaction between phospholipids and SWCNTs causes an ordered lipid layer to form, anchoring onto the sidewalls of the nanotubes. Phosphorothioated DNA are inserted into CdTe/CdS QDs to be used for conjugation with SWCNTs. The non-covalent functionalization techniques maintain useful surface properties of the nanomaterials. Functionalization is characterized by fluorescence spectroscopy and optical microscopy. Because DNA sequences can be easily substituted, this interfacing approach can be applied to different applications. For our system, we demonstrate a nano-walker system that transport QDs along the length of SWCNTs, called the track. This model system mimics protein motors that transport vesicles along microtubules. This study provides a platform for the construction and characterization of nanoscale synthetic systems mimicking those of the biological world.

Poster Number 30: Christopher Browne

"Building Predictive Chemistry Models"

Density Functional Theory (DFT) simulations allow for sophisticated modeling of chemical interactions, but the extreme computational cost makes it inviable for large scale applications. Molecular dynamics models, specifically ReaxFF, can model much larger simulations with greater speed, but with lesser accuracy. The accuracy of ReaxFF can be improved by comparing predictions of both methods and tuning ReaxFF's parameters. Molecular capabilities of ReaxFF were gauged by simulating copper complexes in water over a 200 ps range, and comparing energy predictions against ReaxFF. To gauge solid state capabilities, volumetric strain was applied to simulated copper bulk and the strain response functions used to predict elastic constants, which were then compared against experimental data and ReaxFF predictions. Results suggest ReaxFF's predictions are fairly robust, making it useful for molecular simulations. Training ReaxFF with this data can improve the accuracy of molecular dynamics simulations, providing wider application of molecular modeling software.

Poster Number 31: Dalton Chaffee

"Exploring the Role of the Junction in the Record Single-Junction GaInP Solar Cell"

Solar cell efficiencies have grown in recent years, but further improvements must be made in order for this sustainable energy technology to see widespread commercial use. Traditional solar cells have used either a homo- or heterojunction near the surface of the cell in order to separate carriers to the desired contacts. However, with new advances in technology and improved material quality, the role of the junction has become less clear. Recently designed high efficiency solar cells have taken advantage of high minority carrier diffusion lifetimes to shrink the base and move the junction towards the back of the cell, away from the source of carrier generation. For example, in 2013 a GaInP solar cell was created using a rear-junctioned design with a base width of just 40 nanometers, yielding a record single-junction efficiency of 20.8%. In this study,

we develop a model of this record efficiency cell in Sentaurus™ and compare it to a model of a traditionally structured cell of the same material to discover the mechanisms leading to the rise in efficiency. Preliminary results show a match of all key parameters (Jsc, Voc, efficiency, and fill factor) to within 2% and indicate that the efficiency of the structure can be maximized by removing the base altogether and using the emitter-back surface field contact as an effective junction. These findings lend us a deeper understanding of present-day high-efficiency solar cell operation and suggest how efficiencies can be pushed closer to the Shockley-Queisser limit.

Poster Number 32: Bulgamaa Chinbat, Steven Carden, Bella Chinbat, Sydney Weiss, Utami Irawati

"Slow Sand Filters for Drinking Water Treatment in Schools in Developing Countries"

Across the globe, more than 800 million people (800,000,000) lack access to safe drinking water. Often times, the accessible water contains high turbidity and deadly pathogens. The most common method used in developing countries for disinfecting water is boiling—which is expensive due to the energy requirement, and ineffective, as it doesn't remove turbidity. In this work, we are redesigning slow sand filters (SSFs) as a way of removing turbidity prior to less expensive methods of disinfection. Slow sand filters are a passive technology, requiring no energy input, and rely on microorganisms attached to the sand to metabolize organic material in the water. Previous GEP teams have designed 20 Liter point-of-use SSFs. Currently, a larger 208 Liter (55 gallon) unit is being designed, constructed, and tested. It is anticipated that 5 of these larger units would accommodate the drinking water needs of a school of 200 students. This semester's goal is to show the feasibility of this design by testing the prototype unit using water from a local stream. Testing will examine the efficiency of turbidity and E. Coli removal at different volumetric water treatment rates. It is anticipated that a similar unit will be constructed in Kenya this summer.

Poster Number 33: Ran Cui

"Mass-positioning of nanodiamonds using squeegee technique"

Fluorescent color centers in diamond nanocrystal have recently become the focus of researchers because of their potential applications in quantum information processing, nano-sensing, bio-marking, and bio-imaging. One of the biggest challenges in working with nanodiamonds is how to position them precisely and efficiently to create strong interaction with nano-scale photonic structures. The most popular methods to position nanodiamonds are spin-coating and transporting via atomic force microscope tip. On the one hand, spin-coating, where nanodiamonds are randomly located, is not precise; on the other hand, the tip-based technique, where a single nanodiamond is picked and dropped, is tedious and time-consuming. Hence, we suggest a squeegee technique for mass-positioning nanodiamonds relatively precise and fast. / We fabricated nanohole arrays in a photoresist layer deposited on a silicon substrate using electron beam lithography. The diameter of the nanoholes is in the range from 50 nm to 250 nm to best match the size of the nanodiamonds. Finally, we locate the nanodiamonds by sweeping a droplet of a highly concentrated aqueous suspension of nanodiamonds with a cleanroom wipe. / In order to prove the quality of the technique, we have studied the hole filling ratio using scanning electron microscopy. Our analysis showed that the optimal nanohole size is 125 nm and the filling probability is close to 100%. This technique can potentially facilitate our further experiments where nanodiamonds are coupled to nanophotonic structures. /

Poster Number 34: Rajarshi Das

"Energy and Exergy Analysis of Cogeneration Plant"

The project analyzes the energy and exergy of a cogeneration system providing both power and steam. A full exergy account of the exergy entering and leaving the system is calculated. Further, the exergy destruction of each component in the system has been calculated in a detailed analysis. All these calculations have been utilized to calculate the exergetic efficiency of the entire system. After

calculating the exergetic efficiency, tweaks were made to the temperature and pressure conditions of the system to analyze the effects on the exergetic efficiency of the system.

Poster Number 35: Maggie Del Ponte, Carter Chain

"Biomimetic Polymeric Scaffolds for Cell-based Skeletal Muscle Regeneration"

Upon minor injuries, skeletal muscles have a remarkable capability of regeneration mainly imparted by the muscle stem cells, satellite cells. However, this natural repair process is interrupted under such / circumstances as volumetric muscle loss or muscle degenerative diseases. Current cell-based therapies, such as myoblast transplantation, have significant drawbacks of low survival rates and engraftment efficacy, mainly due to the absence of supportive cell microenvironment. Thus, we aim to engineer a cellular microenvironment through the development of aligned polymeric fiber scaffolds mimicking oriented muscle fibers in natural microenvironment of myogenic cells. Here, we fabricated aligned / poly(lactic-co-glycolic acid) (PLGA) fiber scaffolds with diameters ranging from the nano- to microscale via electrospinning. C2C12 myoblasts were seeded onto these scaffolds and analyzed for the initial cellular responses. Cells on the aligned scaffolds elongated in the direction of the fiber axis resulting from the contact guidance. Furthermore, cells were found to respond to different fiber diameters as evidenced from the differences in cell attachment. Current ongoing studies focus on evaluation of cell proliferation and differentiation on these scaffolds as well as elucidation of the underlying mechanisms governing the cell-matrix interactions. /

Poster Number 37: Isaura Frost

"Optimizing Synthesis of Resilin-Based Proteins for Application in Cartilage Engineering"

Resilin is an elastomeric protein found in insect cuticles which allows them to pivot their wings and is critical in their flight and jumping mechanisms. Its high resilience makes it an attractive choice for applications in cartilage engineering. Our lab has successfully designed and synthesized a recombinant protein

consisting of a resilin-based mechanical domain and a biological domain with a cell-binding motif. The mechanical domain is composed of 10 resilin-based repeats from Anopheles gambiae. Lysines were introduced in the resilin repeats to serve as crosslinking sites for hydrogel formation which can serve as a matrix for cell growth in cartilage engineering. Previous results showed that our resilin-based hydrogels possessed mechanical properties similar to those of human cartilage. In this study, the expression of resilin-based proteins was conducted in shake flasks and the inoculation ratio was varied in order to investigate its effects on bacterial growth rate. The purification of the resilin-based proteins was performed through a salting out and heating process. We have also investigated the ideal salt concentration to induce salting out of the desired protein in order to improve protein yield. Results showed that an increase in inoculation ratio did not affect E. coli growth significantly. On the other hand, protein yield significantly increased up to 1.5 times when the salt concentration for salting out was increased from previous 20% to 25%. These changes may help to feasibly synthetize this promising protein in larger amounts for applications in cartilage engineering.

Poster Number 38: Emily Gill

"Characterization of the Swelling Ratio and Water Content of Resilin-based Protein Hydrogels"

Resilin, an elastomeric protein found in insect cuticles, is known for its extraordinary resilience and elasticity, making it a good candidate as scaffolds in tissue engineering applications, such as cartilage and vascular tissue engineering. Our lab has successfully developed resilin-based proteins with sequences derived from mosquito resilin genes, and showed that crosslinked resilin-based hydrogels possess tunable mechanical properties of the same order of magnitude as native articular cartilage. To understand how these resilin-based hydrogels will behave in physiological environments, it is necessary to characterize their physical properties, such as swelling ratio and water content. In this study, resilin-based hydrogels were manufactured using two different crosslinking reagents and characterized to evaluate swelling ratio and water content. First, resilin-based

proteins were crosslinked with chemical crosslinker, tris(hydroxymethyl)phosphine (THP). THP cross-linked hydrogels were made at varying protein concentrations (i.e., 8-16 wt%) and cross-linking ratios (the ratio between the number of crosslinker and the number of crosslinking site) (i.e., 0.8x, 1x and 5x). Second, resilin-based hydrogels were created with an enzymatic crosslinker, transglutaminase (TGase), in a range of protein concentrations (i.e., 6-12 wt%). Hydrogels of both types were fabricated at 37oC. After fully crosslinking, the gels were immersed in phosphate buffered saline (PBS) to mimic a physiological environment until fully swollen and then freeze-dried. The swelling ratio and water content were calculated using the final swollen weight and the dry weight of the gels. Both THP and TGase cross-linked hydrogels showed that an increase in protein concentration produced a decreasing trend in swelling ratio and water content. In addition, as the cross-linking ratio was increased in the THP cross-linked hydrogels, the swelling ratio and water content decreased.

Poster Number 39: Michael Glapa

"Performance Debugging in Heterogeneous Computing"

Our goal is to run benchmark tests on new HP Moonshot hardware, which includes a CPU and a multi-core DSP (Digital signal processor) made by TI. We will test the performance of these heterogeneous System on Chips to find out which benchmarks outperform traditional hardware, such as multi-core CPU's and GPU's. We will use established benchmarks in order to discover certain patterns regarding which types of computations and which types of data run well on the DSP's.

Poster Number 40: Wei Siang Goh

"Biodiesel from Coffee Grounds"

As the fossil fuels' reserve around the world are depleted gradually, there arise the need for an alternative renewable fuel source. Currently, biodiesel serves as a promising source of renewable fuel. However, it is a fairly expensive process with its feedstock comprising the major cost. For this reason the investigation for new attractive alternative feedstock has been conducted and spent coffee grounds

have been chosen as a potential sustainable biofuel source in replacement of fossil fuels. The astounding idea of converting waste grounds into a potential energy sources have gave rise to this research project. The coffee grounds were first collected and dried to remove moisture. Next, its oil content were extracted using Soxhlet solvent extraction method which then undergo enzyme catalyzed transesterification reaction in a batch reactor to produce biodiesel. Gas chromatography-mass spectrometry were used to analyze and determine the composition of oil and biodiesel obtained. Preliminary results reveals that the maximum yield of coffee oil in spent coffee grounds (SCG) is around 20 wt% and results vary based on the solvent used. Oil to biodiesel conversion is around 32.7 – 53.7% depending on the type of catalyst used and the operating conditions of the experiment. Palmitic, stearic, oleic and linoleic fatty acids are some of the major fatty acid compositions found in the coffee oil methyl esters produced from spent coffee grounds.

Poster Number 41: Sunland Gong

"Measuring and Predicting Powder Flow: An Analysis of Starch and Lactose Powders under Static and Dynamic Conditions"

Powders are widely used in a countless number of industries. The behavior of powders is extremely complex, but also vital. The complexity and irregularity of powders, specifically powder flow, has led to many barriers in producing a valued product efficiently. The ability to predict powder flow is challenging, yet important. Recently, there have been developments on various powder analyzers to predict powder flow. However, there is still no clear and defined parameter to predict the flow of a powder. A variety of methods have been considered to resolve this complication. These methods include both static and dynamic assessments that are used to determine powder flow under certain conditions. The analyses of powder flow are carried out on various types of lactose and starch powders. The decision on the usage of lactose and starch powders is based on their extensive application in the food and pharmaceutical industry. The research on these powders is systematically evaluated by the REVOLUTION Powder Analyzer and the FT4 Powder Rheometer. The results from this study can be used

to correlate the properties of starch and lactose powders to other powders based on similar aspects such as particle size and chemical interactions. The purpose of this study on powder flow provides a greater understanding on how to properly characterize and predict the flow of a powder.

Poster Number 43: Ateev Gupta, Chris Harnack, Mark Schmidt

"MAV Research"

We are interested in the design and control of autonomous micro aerial vehicles in unknown, cluttered environments. The applications for such MAVs range from search-and-rescue, security, surveillance, mapping, and remote sensing. We would like a MAV to hover in place with any body orientation and be able to translate with a zero attitude. Additionally, we want to be able to arbitrarily orient a sensor or gripper attached to the MAV body during flight. In order to overcome the limitations of conventional MAVs and realize fully controllable MAVs, we are investigating new fully and over-actuated MAV configurations and actuation techniques.

Poster Number 45: Thomas Evan Kelemen

"Engineering Optical Tools to Study Redox Biology"

Oxidative stress is a rise in reactive oxygen species that is associated with cell harm. Oxidative stress can play a role in many diseases such as Parkinson's disease, Alzheimer's disease, and even the process of aging. In order to study the effect of oxidative stress in cells, a sensor is needed, and fluorescent proteins have been used to create such sensors that can detect redox changes. Using molecular biology and protein biochemistry, a sensor is being characterized to accomplish this task. A sensor called Grx1-roGFP2 will be studied as a purified protein with fluorescence spectroscopy and then used to measure oxidative stress in live cells with microscopy. This sensor should be able to be monitored simultaneously with other fluorescent sensors to measure many different things in the live cell and its environment. The use of this sensor in combination with other similar sensors will give insight into oxidative stress in cells and help better understand its role. / /

Poster Number 46: Demetra King

"The Effect of Interactive Web-based Breastfeeding Monitoring on Maternal Breastfeeding Self-Efficacy and Satisfaction: A randomized control trial"

Background: Breastfeeding self-efficacy and satisfaction are strong predictors of breastfeeding duration and exclusivity. Strategies that promote maternal breastfeeding self-efficacy and satisfaction are needed. / / Purpose: To determine the effect of a web-based monitoring system on maternal breastfeeding self-efficacy and satisfaction. / / Methods: A two arm, repeated-measures randomized control trial took place in three Midwestern hospitals. Subjects were randomly assigned to a usual care or intervention group. Mothers in usual care followed standard hospital protocol, while mothers in intervention were given access to an interactive web-based breastfeeding monitoring system and prompted to record breastfeeding and infant output entries for 30 days. A follow up survey was sent to both groups at 1, 2 and 3 months. Each follow-up contained a breastfeeding self-efficacy scale (BSES), and the third follow-up contained the Maternal Breastfeeding Evaluation Scale (MBFES). / / Results: There was a significant difference between groups at the 2-month follow-up (p = 0.0394), with the intervention group having a higher average breastfeeding self-efficacy score. Within the intervention group, there was a significant difference between the scores compared at 1 and 2 months (p = 0.0002) and the scores at 1 and 3 months (p = 0.0201), with the average scores being greater at 2 and 3 months compared to the first month. There was also a significant difference between the groups regarding breastfeeding satisfaction (p = 0.0196). The intervention group reported a higher average score (119.6) compared to the control group (112.8). / / Conclusion: The interactive web-based breastfeeding monitoring had significant effect on breastfeeding self-efficacy and satisfaction.

Poster Number 49: Joseph Lorenzetti

"Utilizing Open Source Tools for Dynamics and Control Analysis of Non-linear Systems"

Open source tools are a popular option for researchers due to low cost, quick feature implementation, and broad operability options. Research in Unmanned Aircraft Systems (UASs) such as cybersecurity, Guidance, Navigation and Control (GNC) in GPS denied environments, Human-UAS interaction, and vision aided navigation and control all rely on small scale models where open source systems enable the required customization. Additionally, utilizing open source computer algebra systems can aid in complex mathematical derivations that are common in dynamics analysis. This project looks specifically at a Python based open source tool-chain utilizing the Sympy Computer Algebra System to perform dynamics and control design, and then the PixHawk Autopilot package to implement the algorithms. A small self-balancing robot system is used as the test-bed for these methods. Sympy was used to perform analysis and linearization of the system dynamics, to do system identification analysis, and then to design a PID controller. The developed controller was then tested on the "Segway" system powered by the PixHawk Autopilot. It was found that using the Sympy CAS allows for a reliable determination of the dynamics of the system by eliminating potential human errors while deriving the complex equations of motion. This approach also provides students and researchers broad access to control system design tools because of the low cost; unlike options such as

Poster Number 50: Mingxuan Lu

"Development of Electron Microscopy Analysis and Simulation tools for nanoHUB"

Electron microscopy has a crucial role in the field of materials science and structural biology. Although electron microscopy gives lots of important results and findings, some additional simulations and image processing/reconstruction is required to get more information from the data that are collected from the experiments. For this purpose, researchers are using IMOD1 and QSTEM2 for electron microscopy analysis and simulation. IMOD is a set of programs used for tomographic reconstruction and 3D visualization and QSTEM is used for quantitative simulations of TEM and STEM images. However, IMOD and QSTEM are hard to install or use for beginners who are not familiar with computational

skills. To overcome this issue, we have developed "Online IMOD and STEM tools" to allow users to perform microscopy analysis and simulation with ease. We applied several ways to launch or combine tools. Based on the original source codes of the software, we used the graphical interface builder Rappture to build a new interface to launch several tools. Also, we used the nanowhim window manager to combine and organize tools. The online version of IMOD and QSTEM will enable researchers from all over the world to use IMOD and QSTEM programs directly and easily on the nanoHUB website.

Poster Number 51: Jordyn McCord, Michael Mavity, Shanygne Ashley Damayo, David Wintczak

"Universal Method for Analyzing Counterfeit Drugs"

The selling of counterfeit drugs in Tanzania poses a major problem. It is common for drugs to be sold by vendors in markets throughout Tanzania but they often mimic the size, shape, and packaging of genuine drugs without offering the desired effect. These counterfeit drugs waste resources, put individuals at risk and discourage purchasing genuine and life-saving drugs. With the work of this Global Development Team (GDT), it is desired to develop a universal method for distinguishing between counterfeit and non-counterfeit drugs in Tanzania. The team will also develop training materials to implement the project at the Kilimanjaro School of Pharmacy in Tanzania. High Performance Liquid Chromatography (HPLC) is used to compare samples of drugs to standards to test for the presence of the active pharmaceutical ingredient (API). Using the pure API, chromatograms have been collected from the HPLC and will be used as standards for efficacious drugs. Current methods to combat the counterfeit drug problem are selective to the pharmaceutical ingredient being tested and not universal. Continued research will further simplify the methods and make this project comprehensive for a variety of commonly counterfeit medications.

Poster Number 52: Alexandra Milat, Bethany Ellis

"Assessment of New Learning Technologies for Faculty or Student Use"

In the past few years, access to web based information and technology tools has become an important part of pedagogy in collegiate education. Faculty in many disciplines today adopt new software applications and computer hardware technologies regularly as a means of giving their students alternate paths to learning their course material. But, how do faculty decide how well a technology tool, for example, a web based software application, will support their student's learning experiences or their own interactions with or management of student learning. / This paper's purpose is to demonstrate how to use web interface quality heuristics designed for evaluating web applications to evaluate a learning technology in terms of its usefulness in supporting student learning or faculty in course management. To conduct our analysis we selected a popular web based faculty tool that facilitates teamwork learning, the Comprehensive Assessment for Team-Member Effectiveness (CATME). CATME is in use at over 1,000 collegiate institutions worldwide by over 6,000 faculty. / Research conducted by Nielsen and Molisch in 1990 and refined in 1994 defined 10 criteria for evaluation of the User Interface in web design. Nielson's criteria were further examined and strengthened by Borges, Morales and Rodriguez in 1998, by Monideepa Tarafdar and Jie Zhang in 2005 and by Cristian Rusu, Silvana Roncagliolo, Virginica Rusu and Cesar Collazos in 2011. We used 8 of these criteria, developed and refined over the past 20 years and which we judged as measurable through a survey and unique, as our assessment framework. We then surveyed 100 CATME faculty users at a major Midwestern University on each of these 8 criteria and analyzed the survey data. / Our analysis identified strengths of the CATME system and opportunities to improve its usefulness to new or frequent CATME users. Use of our assessment framework and our analysis process is replicable across many new types of learning technologies.

Poster Number 53: Alexander Muller

"Synthesis and Characterization of Radical Polymers for Use in Flexible Polymer Thermoelectric Devices"

Polymer thermoelectric (TE) devices are desirable because of their convenient properties for mobile applications and their ability to be produced at low-cost using well-established solution based techniques. Radical polymers are an emerging class of conducting polymers that have been shown to have electrical conductivities on par with π-conjugated polymers and are readily synthesized by reversible addition-fragmentation chain transfer (RAFT) polymerization. Poly(2,2,6,6-tetramethylpiperidinyloxy methacrylate) (PTMA) is a well-studied radical polymer that has demonstrated moderate TE properties. The relatively high glass transition temperature of PTMA (Tg ~170 °C), however, causes significant fracturing when deposited as the thick films (~40 m) required for TE devices, significantly limiting device performance and lifetime. As such, it is desirable to synthesize a radical polymer with a lower glass transition temperature that could produce continuous films. Specifically, we seek to extend the pendant alkane chain, as proximity of the radical site to the backbone promotes steric hindrance and therefore significantly increases the glass transition temperature of the polymer. Here, we polymerize hydroxyethyl methacrylate (HEMA) via free radical polymerization to form poly(hydroxyethyl methacrylate) (PHEMA). Next, using Steglich esterification chemistry the nitroxide functionality is added to the pendant groups of the polymer chain. Finally, the pendant groups are oxidize to form the final radical form the of the polymer Characterization via 1H nuclear magnetic resonance (NMR) spectroscopy indicates successful synthesis of the polymer (PHEMA). Finally, we can demonstrate the lower glass transition temperature of the radical polymer via differential scanning calorimetry (DSC) and its effects on the TE performance.

Poster Number 55: Andrew Parker

"Viscosity and particle effects on highly viscous granular materials"

The factors that influence the behavior of granular systems are important for a variety of industries, including consumer products, food processing, and defense technologies. Of particular interest is the desire to effectively model the mechanical properties of plastic explosives such as Composition C-4 and Semtex 1A. Currently, very little is understood regarding the behavior of these granular

systems that consist of high viscosity, non-Newtonian binders filled with particulates in a 91wt% particles to 9wt% binder ratio. Additionally, there is currently no effective inert simulant of either of these plastic explosives. The goal of the project is to study some of the factors, specifically binder viscosity and particle effects, that could influence the granule properties. Within a given particle size distribution, our data show that increasing binder viscosity increases peak flow stress, or effective granule strength. Additionally, our data show that granules with spherical particles are stronger than those with non-spherical particles. Taken together, these data indicate that granules of spatially variable viscosity with multiple size fractions, such as those in plastic explosives, cannot be modeled as single viscosity, monomodal granular materials as they were treated previously. Furthermore, these data establish a framework for further studies in multimodal size fractions as well as more particle shapes.

Poster Number 56: Joshua Patel

"Thermodynamic simulations to optimize combustion in a homogeneous-charge compression-ignition engine"

The purpose of this research is to optimize combustion in homogeneous-charge compression-ignition (HCCI) engines. HCCI engines are advanced engines which have the potential to provide high thermal efficiency with low emissions of toxic pollutants. However, the practical realization of the engine concept is challenging because of difficulties in controlling ignition over a wide range of operating conditions. / In this work, zero-dimensional simulations are carried out to assess the influence of fuel chemistry, intake pressure and temperature, exhaust gas recirculation, compression ratio, and wall heat loss on ignition time and heat release rates. The zero-dimensional (thermodynamic) simulations are appropriate for these studies because the mixture is assumed to be homogeneous. As part of the project, it is also planned to vary the intake conditions dynamically during engine operation to adjust for engine heating. Preliminary findings are available showing, as expected, high sensitivity to intake temperature and lower sensitivity to pressure. Methane and n-heptane have been employed as fuels. Additional fuels will be studied. Methane is less sensitive to variations than n-heptane

suggesting that using combinations of fuels can accomplish operation over a wider range of operating conditions. /

Poster Number 57: Saulo Cesar Rodrigues Pereira Sobrinho

"More cameras or more samples? A statistical analysis of the trade-off in spatial-temporal sampling"

Images and videos are the single largest portion of the data being processed on modern communication and computing infrastructures. While cameras nowadays are so inexpensive that they can be massively deployed, the volume of the spatial-temporal data which they collect is becoming a huge computing bottleneck. However, the real question is: Do we really need all of these data for a visual computing task? If not, what would be the optimal way of sampling these data without losing the information? / In this project, we study a simple classification problem of classifying outdoor cameras versus indoor cameras by analyzing the videos they collect. Formulating the problem into a statistical decision problem and analyzing the asymptotic normality of the decision error, we rigorously prove the relationship between the number of cameras required and the number images to be collected. Our results show that while temporal samples could improve the accuracy of the classification, excessively collecting these temporal samples is unnecessary. In contrast, deploying more cameras could significantly improve the decision boundary. We also discuss ways of improving the decision. Future work will be focused on analyzing the real video data. / /

Poster Number 58: Ram Saraswat

"High Capacity anodes for lithium ion batteries"

Recently, silicon has been the center of attraction for the high capacity lithium ion batteries. This is because silicon materials can deliver a specific capacity of 4200 mAh/g, about 12 times the traditional graphitic materials. Silicon is the 2nd most abundant element, so it is readily available at low cost. But, Lithium-Silicon electrodes suffer from volumetric expansion (about 300%) during lithiation and contraction during delithiation – such morphological changes causes pulverization

of the silicon material and excessive SEI formation, causing poor cycling performance. Our approach is to use a Silicon and Carbon composite. In this composite, the silicon nanoparticles are located inside the carbon hotels. This way the silicon expansion takes place inside the porous carbon, thus the overall shape and structure of the electrode do not vary much during lithiation and delithiation. In the poster, we will be discussing about the electrochemical performances of the half-cell made using silicon-carbon composite as the cathode, Lithium metal foil as the anode, Cellgard 2500 separator, and LiPF6-FEC electrolyte.

Poster Number 59: Patrick Skrodzki, Jason Becker

"Double-pulse Laser-induced Breakdown Spectroscopy with Glass Samples Containing Uranium"

Special nuclear material (SNM) detection is of utmost importance for numerous applications. The SNMs of note include U and Th, heavy elements with distinct properties having complex atomic structures. Some applications include nonproliferation and nuclear forensics, industrial safeguard endorsement and nuclear fuel prospecting. However, potential applications require portable, remote, non-invasive method for detection and analysis. A suitable technique for SNM detection is laser ablation (LA). Laser-induced breakdown spectroscopy (LIBS) entails ablation of a target sample by one or multiple laser pulses providing elemental composition of target sample. Despite low sensitivity compared to chemical breakdown analyses, LIBS effectively meets practical criteria previously defined and provides real-time, multi-elemental analysis useful especially in prospecting and nuclear industry. / One major limitation in the LIBS technique and the motivation for this study involves complex atomic structures of high-Z materials such as SNMs. Heavy, electron-rich elements such as U and Th emit many characteristic wavelength lines through electron transitions that appear clustered on LIBS spectra (see Fig. 2). Thus studying U becomes difficult as even the strongest U lines are challenging to discern among these crowded spectra. Double-pulse LIBS (DPLIBS) amplifies observed signal for most lines over conventional single-pulse LIBS (SPLIBS). DPLIBS technique involves sequential firing of two pulses; the first pulse ablates the target sample, and the second

pulse re-heats and re-excites the formed plasma so more intense signal becomes evident. Experiments in this study use glass containing bulk amounts of Ca, Si, and Na with 1.3% U by mass. This study ultimately analyzes enhancement of U analyte, as a trace element in glass matrix, signal with DPLIBS as compared to SPLIBS. /

Poster Number 60: Emily Soltys

"Rheological Characterization of Cementitious Mixtures with Free Polyethylene Oxide"

The effects of free polyethylene oxide (PEO) chains on cementitious magnesium oxide (MgO) suspensions were examined through shear start up tests, creep tests and flow curves. Previous experiments used varied amounts of ADVA, a superplasticizer found in commercial cements. Samples with greater amounts of ADVA experienced higher overshoot peaks during shear start up tests, which was due to unadsorbed ADVA. Because the side chains of ADVA are composed of PEO, free PEO chains were introduced into new samples with constant ADVA to investigate particle aggregation. The free PEO chains were added from 0-50 wt% of ADVA. MgO and free PEO suspensions without ADVA were also tested. To reduce wall slip and sedimentation, a vane fixture and sandblasted cup were used along with preshearing the samples. / ADVA was found to increase the workability of MgO suspensions. While creep tests showed that ADVA-adsorbed samples required a greater stress to flow (5 Pa for unadsorbed vs. 20 Pa for adsorbed), some of the unadsorbed MgO particles settled to the bottom of the sandblasted cup. This made the suspension appear thinner. Superplasticizers such as ADVA are used in industry to disperse particles, so without it the suspensions do not easily retain a uniform consistency. Flow curves support the presence of depletion flocculation and depletion stabilization in the suspensions. As the particles flocculate, shear stresses increase from 10-30 wt% PEO. Particles then stop coming together and stabilize, which decreases the shear stresses for 40 and 50 wt% PEO. /

Poster Number 61: Luke Stepan

"Regulation of MOR by Different Abiotic Stresses in Arabidopsis thaliana"

The climate is changing and as a consequence the environment is becoming hotter and drier. How different plants will react to these changes is unknown. Identification of genes involved in stress tolerance can help predict plant-environment interactions and lead to stress tolerant plants. The MOR gene (Modulator Of Root ROS, ROS = Reactive Oxygen Species) in the model plant Arabidopsis thaliana encodes a transcription factor that may regulate stress responses as mor mutants are drought tolerant. We hypothesized that MOR expression changes in response to different abiotic stress stimuli. We tested MOR expression in response to salt (NaCl), abscisic acid (ABA), osmotic stress (Mannitol), drought, and heat. For the first three stresses wild type seedlings were grown under our standard conditions and then transferred to a treatment for 24 hours. For drought stress plants were grown in soil and watering was withheld from mature plants for 10 days. With all samples a quantitative reverse transcriptase Polymerase Chain Reaction (qRT-PCR) was run to find changes in gene expression. For heat stress, mutants and wild types plants were transferred in a 30°C environment and root growth was monitored daily. MOR gene expression did not change in the presence of salt or ABA but was slightly repressed by osmotic stress. However, drought stress strongly induced MOR. mor mutants showed less sensitivity to heat stress. Our data shows that MOR is not regulated by salt or ABA, but is involved in drought pathways. This means that the gene is specific to certain types of stresses, instead of signaling for many types.

Poster Number 62: Beata Strubel, Jake Davis

"Modeling Student Perceived Costs and Benefits to Cooperative Education Programs (Co-Ops) and Pathways to Participation"

Cooperative education programs provide a rich educational experience linking academic studies to professional industry experience. Previous studies have shown benefits of co-op participation, including increased grade point averages (GPA), greater confidence in choice of career, and relatively higher post-graduation starting salaries. Building on previous research about characteristics of students who participate in co-ops, this study will further the literature by

examining perceived benefits and barriers for students who do not choose co-ops. Choice Theory will be used as a theoretical framework to model perceived benefits and costs of participating in co-op. The opportunity cost of co-op from the perspective of co-op and non-co-op students is hypothesized to be significantly different. / / In this research, co-op and non-co-op students from a large Midwestern U.S. research university will be surveyed to increase understanding of perceived benefits and barriers to co-op participation and to identify whether there are differences when the responses are disaggregated by gender and race/ethnicity. Results of the survey will be analyzed using multiple approaches. Decision tree modelling will be used to build a conceptual model of the pathways to co-op participation, as well as to examine relationships between student backgrounds and pathways. Additionally, logit regression will be used to model factors associated with co-op and non-co-op participation. This study will identify students' reasons for choosing or not choosing co-op to help co-op offices develop strategies to strengthen recruitment of diverse students. Future work will include follow up interviews with students from this survey to gain a richer understanding. Results will also provide stakeholders with critical information regarding students' perceived benefits of co-ops compared to other educational activities, with potential implications for the diversification for the engineering labor force.

Poster Number 64: Kunal Thaker

"Cross-section IR thermal measurement"

Measuring thermal conductivity and other thermal properties of materials by passing a heat flux through a sample and reference layers then analyzing the resulting temperature profile.

Poster Number 65: Alisha Tungare, Jaycey Hardenstein

"Enzyme-Assisted Pathogen Detection Applied to a Microfiltration System for Food Safety"

With a growing number of consumers in the American market and with food production at an all-time high, food safety is a huge priority for both consumers and corporations everywhere. Recently, the Laboratory of Renewable Resources Engineering (LORRE) at Purdue University developed a Continuous Cell Concentration Device (C3D) that has the potential to reduce the amount of time required to detect foodborne pathogens. The C3D utilizes microfiltration to produce a smaller, concentrated sample, which facilitates the identification of microbial populations. Before cell concentration, food samples are subjected to a pretreatment process that utilizes enzymes to prevent the buildup of proteins and large molecules that can plug the hollow-fibers used in the C3D. Pretreated samples are then run through the C3D to recover a solution with a higher concentration of microbial cells. Our research investigates the role of enzymes to enable microfiltration and ensure recovery of Escherichia coli (E. coli) in ground beef solutions. We are working to quantify the effect of enzyme pretreatment E. coli cell viability. Experiments are currently being conducted to determine the effect of enzyme treatment, if any, on microbial cell growth and to optimize the amount of enzyme used. Preliminary results show that enzyme pretreatment effectively breaks down large proteins and prevents fouling of the membrane, as enzyme-treated solutions filter four times faster than untreated food solutions and recover more than 90% of E. coli during the pretreatment process. Thus, enzyme pretreatment, coupled with C3D technology, begins to address the critical need for rapid pathogen detection.

Poster Number 67: Guanyu Zhou

"Electric field study of biological systems"

Worldwide, more than 782,000 people were estimated to have been diagnosed with liver cancer and around 745,000 people were estimated to have died from liver cancer in 2012. According to the World Health Organization (WHO), at least 550,000 people die each year from the liver cancer. Therefore, there is a need for people to develop an effective way for the liver cancer treatment. While there may be vary drugs be developed, people still need a way to transport the non-permeant ones to the cell interior. Electroporation is a highly efficient technique

in which an electrical field is applied to the tumors in order to increase the permeability of the cell membrane, allowing the drugs to be introduced into the cell. Obviously, to apply this technique, it is important to see what is going on inside the tumor when the electric field is being applied. Therefore, in this research, the software, ElecNet, was used to show the electric field distribution inside the tumor and liver during the process of electroporation. Several 2D models were created to show the field intensity and electric potential inside the liver with different types of electrodes, such as parallel plane electrodes and 8-needle electrode arrays. Moreover, data were collected and compared for different positions both inside the liver and the tumor with the critical field strength at around 1,200 V/cm. Several plots were created according to the data collected to provide more intuitive results. Furthermore, various dimensions of needle electrode arrays and different positions of parallel plate electrodes were also applied to get more general results. These results will help to improve the electroporation process for liver tumors and are consists with previous studies of electroporation on both breast tumor and brain tumor. Further research should create some 3D models to confirm these findings.

Poster Number 155: Nicholas DiCola, Madeleine Griffin

"Using Python and OpenCV library"

Animal models of different neurological disorders are required for studying the pathophysiology of these diseases, and for potential development of pharmacological and behavioral treatments. The scientific community often uses mouse models for behavior studies due to their powerful genetic tools and low cost. However, subjective measurement techniques are often used when analyzing mice for behavioral traits which often results in discrepancies in results. We have developed a software program which offered an ability to automatically collect open-field behavioral data with simultaneous on-line analysis. We used python, an open sourced programming language, and opencv, an open sourced computer vision library, to create this novel tracking software. Wild type mice were put into an open field environment and allowed to freely interact with it. Position and cross sectional area of a mouse were automatically tracked and

quantified. In addition, we have set up an open-field visual stimulation paradigm, which is intended to be used to test visual perception, visual learning and behavior in mice. The methods created in the project could be used to quantify most changes in behavior and could be used in recognizing behavioral changes in mouse models with mental disorders to test for improvement or deterioration of condition.

Poster Number 164: John Hemmerling

"Identification and Quantitation of Contaminants of Emerging Concern in Commercial Biosolid-based Fertilizers"

The use of commercially available biosolid-based fertilizers on urban and suburban lands has increased in recent years because of their economic, environmental, and plant nutrition benefits. Given that biosolid-based fertilizers are derived from waste water treatment plant residuals, we hypothesized that emerging contaminants of concern in the waste stream would persist in these products. We focused on the detection and quantitation of high-priority micropollutants including various perfluoroalkyl substances, synthetic musk fragrances, hormones, parabens, pharmaceuticals, and personal care products. These contaminants were selected because of their potential impact on human and ecological health and their bioaccumulation risk. For comparison, we also evaluated non-biosolid based fertilizers including composted animal manure, mushroom composts, and organic composts. All fertilizers were extracted using a modified ultrasonic assisted solid-liquid technique followed by a 20 h equilibration during which samples were rotated end-over-end. Prior to analysis, all solvent extracts were concentrated under nitrogen and internal standards added to account for matrix effects during sample analysis. Quadrupole time of flight liquid chromatography mass spectrometry (QTOF-LCMS) was used to identify and quantify the targeted contaminants of interest. Concentrations of the targeted contaminants were higher in the biosolid-based fertilizers than the non-biosolid based fertilizers. Although many of these chemicals persist in commercially available biosolid-based fertilizers, future research is still needed to

determine what, if any, potential risk these contaminants may pose to human or ecological health at the detected concentrations.

College of Health and Human Sciences

Poster Number 68: Alice Ahn

"Disgust, Empathy, and Fitness: How Disgust and Empathy Interact in Evolutionarily-Relevant Situations"

Our research aims to study if empathy acts differently when groups are stigmatized for either biological reasons (i.e., people living with HIV) or cultural reasons (i.e., people who eat dog meat). We hypothesize that because feelings of cultural disgust are learned, they will be less resistant to the effects of empathy. / We adopt a 2 (type of disgusting vignette: biological vs. cultural) x 2 (empathy manipulation: perspective taking vs. objective) between-subjects design. The dependent variable is participants' ratings of disgust for a given vignette in that moment. A total of 250 participants are recruited from the Amazon Mechanical Turk (MTurk) website: 50 for norming the level of disgust present in each vignette and 200 for the actual experiment. The procedure is as follows: 1) participants are told to either take the perspective of the protagonist or to stay objective while reading a vignette that is either culturally or biologically disgusting, 2) participants are asked to complete tasks that gauge their levels of state disgust, empathy and feelings of stigmatization experienced toward the protagonist depicted in the vignette and 3) participants complete a short demographic questionnaire. / Our hypothesis indicates that we expect no main effects of the type of disgust or the level of empathy experienced, but do expect an interaction between these two factors. If our hypothesis is true, this study will allow us to further our understanding of how disgust (and by extension, stigma) is affected by more or less fitness-relevant situations.

Poster Number 69: Joseph Amaro

"Optineurin expression and pathogenesis in toxicant-induced rodent model of Parkinson's disease"

Idiopathic Parkinson's disease (PD) is a neurodegenerative disorder characterized by the loss of dopaminergic neurons in the substantia nigra pars compacta (SNpc) and the formation of Lewy Bodies and Lewy Neurites (LBs and LNs, respectively). The mechanisms behind early pathogenesis in PD are poorly understood. A caudal to rostral pattern of LB formation is observed during the course of the disease, initiating at the dorsal motor nucleus of the Vagus nerve (X), spreading through the basal ganglia, and extending to the cortical regions of the brain. Optineurin (OPTN) is a protein involved in multiple cellular pathways that overlap dysfunction in PD; e.g. autophagy, mitochondrial dysfunction, and Golgi fragmentation. Following the application of a PD toxicant, we observed a change in OPTN expression in dopaminergic neuron of the SNpc. However, it is currently unknown if OPTN is involved in any PD mechanisms. OPTN silencing by RNAi or overexpression induced Golgi fragmentation, a mechanism in PD that is reported to occur prior to LB formation. We propose OPTN has a role early in PD pathogenesis, particularly during the induction of Golgi fragmentation prior to LB formation. Hence, we will look for OPTN expression along the route of LB progression in PD. If successful, OPTN could prove to be a new therapeutic target or biomarker for early PD detection and improve clinical intervention.

Poster Number 70: Madison Baker

"Mercury and Endocrine Disruption: Current Knowledge and Research Needs"

Research has concluded that mercury hinders neurological development and effects the nervous system. However, it's possible that mercury also disrupts the endocrine system. Research has yet to confirm a negative effect, therefore, it is a topic of interest. The objective of this study was to review previously published research papers to determine if there is any correlation between the two. The papers were selected based on whether they included elements such as the

thyroid gland, the pituitary gland, the adrenal gland, and hormones like TT3, TT4, progesterone, estrogen, and testosterone. Using PubMed, around 50 articles were selected and evaluated based on consistent results, relevance, and quality. After the articles were read and analyzed, a table was made to organize the papers based on key element design. Once the table was complete, it was easy to analyze the results. From the papers, it is obvious that the levels of TT3 and TT4 of the thyroid gland decreased. Mercury showed hindrance of the adrenal gland and the effectiveness of fertility hormones, however, there was no significant effect on the pituitary gland as a result of exposure to mercury. The papers revealed that there is not enough evidence to support the claim that mercury is an endocrine disruptor. A lot of the studies possessed confounding variables such as PCBs that could have skewed the results. Further investigation needs to be done on this topic in order to draw conclusions.

Poster Number 71: Everett Baker

"Influence of Anti-Angiogenic therapy on the Prevalence of Breast Cancer Stem Cells"

Current therapeutic regimens of angiogenic inhibitors in breast cancer patients have increased progression-free survival but not overall survival. We hypothesize that by altering the tumor microenvironment through targeting of the tumor vasculature, such therapies produce localized tissue hypoxia and result in therapy-resistant BCSC populations or initiate metastastic growth. To achieve an optimal outcome, a regimen of AAT will be investigated to target the BCSC-niche by modulating tumor hemodynamics. In this study, a dose response of VEGFR2 inhibitors on breast cancer stem cell biomarkers, ALDH1 and EpCAMand tumor hemodynamics using dynamic contrast-enhanced CT (DCE-CT) and photoacoustic computed tomographic spectroscopy (PCT-S) is investigated. / A dose response was observed to DC101 for both ALDH1 and EpCAM individually, however sections containing both ALDH1 and EpCAM showed no dose response. A significant reduction in ALDH1 expression was observed between untreated and MD, and HD groups, with an increase from MD to HD groups; while a reduction in EpCAM was observed between LD and MD groups, with an increase between

controls and LD. DCE-CT and PCT-S indicates that a more efficient set of hemodynamic parameters may have occurred within the MD group, where changes in perfusion (+26%) and Fp (-30%) on average resulted in a shorter mean-transit-time and the fraction of the vasculature with low SaO2 levels decreased (from 23% to 10%) not observed in LD or HD groups. Current work is developing quantifiable results for both IHC and in vivo imaging results. / Anti-angiogenic drugs targeting VEGFR2 has been shown to modulate the breast cancer stem cell biomarkers ALDH1 and EpCAM. Preliminary data demonstrate that vascular physiologic parameters obtained from DCE-CT and PCT-S may provide potential diagnostic factors. /

Poster Number 72: Austin Black

"Fitness-Relevant Reasoning and the Wason Selection Task"

Previous studies have demonstrated that people are skilled at reasoning about social contracts. Specifically, it is thought that people are especially good at detecting cheaters because it likely enhanced inclusive fitness (Cosmides, 1989; Fiddick et al., 2000). This evolutionarily-relevant criterion begs the question: Do other fitness-relevant criteria produce similar effects? Our research aimed to extend Cosmides' findings to other fitness-relevant cases, such as recognizing fitness-relevant characteristics of predators. / 120 undergraduates participated in our study for course credit. / / Participants were randomly assigned to either the predator-recognition group or the control group, and were given three Wason selection tasks to solve, including an abstract rule, a standard social contract rule, and either 1) a predator-recognition rule (identifying venomous snakes) or 2) a control rule (identifying tropical snakes). Order of presentation was counterbalanced, and the results were be analyzed using simple one-way ANOVA with planned comparisons. / / We were primarily interested to see 1) whether performance in the predator-recognition condition is better than in the control condition; and 2) how performance in the predator-recognition condition compared to the other two conditions (social contract rule and abstract rule). We expected that participants would solve fitness-relevant problems (in this experiment, rules about venomous snakes and social contracts) more readily than

non-fitness-relevant problems (the abstract and tropical snake problems), but made no predictions regarding comparisons within fitness-relevant and fitness-irrelevant tasks (predator vs. social and tropical vs. abstract).

Poster Number 73: Emily Boyne

"Gender, Clothing, and Perceived Intelligence: Do Clothes Really "Make the Man/Woman?""

Impression formation and stereotyping and prejudice literature has examined differences in perceptions of men and women for years and found that differences are believed to exist in a variety of areas, such as in spatial and mathematical abilities, personality, and mental health. Research has demonstrated that impressions are formed spontaneously, almost instantaneously, and are influenced by various cues, both socially and environmentally. How people are perceived varies greatly depending on many characteristics, such as clothing or gender. Clothing influences our perceptions of people greatly depending on the situation in which a person is interacting, the culture, and the social norms associated with the situation. Gender influences our perceptions, and these perceptions are further influenced by gender stereotypes, heuristics, and social norms. Due to what is known about trait formation, stereotypes of gender, and cultural norms of clothing, predictions could be made to see the influences of clothing on perceptions of intelligence, based on whether the person being perceived as intelligent is male or female. / It is expected that perceptions of intelligence will be higher for men than women, and a similar effect with formal over casual clothing, with men in formal clothing being rated the highest, and women in casual clothing being rated the lowest. Additionally, an interaction is predicted such that women will get an "intelligence" boost less than men when they are in formal versus casual attire, and these perceptions of intelligence will mediate decisions to hire an ostensible job applicant. /

Poster Number 74: Ryan Brebberman

"Effect of Phenethyl Isothiocyanate on p21Waf1/Cip1 Regulation of Cell Cycle Arrest in Pancreatic Cancer Cells"

Pancreatic cancer continues to be a disease with a dismal prognosis primarily due to diagnosis occurring later in the progression of the disease. Once at an advanced stage, treatment of the tumor through conventional therapies often proves ineffective prompting the need for preventive strategies for this cancer. Phenethyl isothiocyanate (PEITC) is a natural compound found in cruciferous vegetables such as watercress. In this study we show that PEITC inhibited proliferation of MIAPaca2 and PL45 pancreatic cancer cells, and induced mitotic arrest within 8 and 16 h of treatment as evidenced by a dose-dependent increase in expression of phospho-histone H3 (Ser10), a marker of cells undergoing mitosis. Treatment with PEITC led to phosphorylation of p53 tumor suppressor protein, and modulated the p53-inducible gene product p21Waf1/Cip1. PEITC induced a dose-dependent upregulation in p21Waf1/Cip1 tumor suppressor protein in MIAPaca2 and PL45 pancreatic cancer cells within 4 and 8 h of treatment. In conclusion the growth inhibitory effect of PEITC was associated with activation of p53, upregulation of cyclin-dependent kinase inhibitor p21Waf1/Cip1, and induction of mitotic arrest in pancreatic cancer cells, and warrants further investigation of PEITC as a chemopreventive agent for pancreatic cancer. This study was supported in part by PUCCR ACS IRG#58-006-53 (awarded to SDS).

Poster Number 75: Lexie Buchs

"Effects of Dietary Protein and Aerobic Exercise on Functional Connectivity in Brain Reward Centers: A Resting-State fMRI Study"

Previous data have demonstrated a disruption of Salience Network (SN) and Default Mode Network (DMN) activity in obesity. This study examined the effects of dietary protein and aerobic exercise on resting state activity in the SN and DMN using functional Magnetic Resonance Imaging (fMRI) in 8 women ages 18-45 years old with a BMI of 30 to 40 kg/m2. On testing days, breakfast and lunch were

identical while dinner meals varied in protein (Normal Protein: 15% vs High Protein: 30% of energy as protein). Total energy intake on testing days was prescribed at approximately 80% of the participants' estimated daily energy requirements to stimulate one day of moderate energy restriction. Participants completed a pre-dinner scan five hours after lunch. After scanning, subjects either rested or exercised for 30 minutes at 60% of their estimated VO2max prior to dinner. The postprandial fMRI scan was completed one hour after dinner. The independent component analysis did not reveal a SN, but did reveal a DMN. However, DMN activity was not influenced by meal consumption, acute aerobic exercise, or the amount of protein at dinner. These results indicate that protein and aerobic exercise do not induce modulation of the SN or DMN in obese women.

Poster Number 76: Erick Cleveland, Asmah Amir-Khani

"Inhalation Exposure to Nano-Sized Particles Released from Carbon Black Suspended in a Liquid State"

Objectives: (1) To determine the temperature at which the most amounts of particles are release into the air and to determine the size range of the released particulates and their concentration. (2) To provide significant data on the results of the experiment and analyze its implications for a biological response. / / Methods: Nanosight was used to determine the particle size distribution for our control sample of a 1µg/mL carbon black solution. A 100 mL solution of 1µg/mL carbon black powder suspended in water was made in a 125 mL Erlenmeyer filter flask. The flask was covered with many layers of parafilm to keep from melting, and two holes were made at the top, one for the thermometer, and another for the Y-connector, which was connected with clear tubing at one side to the Scanning Mobility Particle Sizer (SMPS) and to the Optical Particle Sizer (OPS) on the other side. Data was collected of the background, at 30°C, 60°C and 80°C. The solution was placed onto a laboratory hot plate to increase the temperature of the solution from room temperature. After 80°C, the solution was then allowed to boil. Data collected from the experiment was then analyzed to see airborne particle size concentration.

Poster Number 77: Melissa Davoust

"The Clinical Utility of the DSM-5 Personality Disorder Models"

This study assesses the clinical utility of an alternative model of Personality Disorder published in the 5th edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5). The categorical model from the 4th edition of the DSM was retained in the main body of the recent edition, while the alternative model was included for further study. Using a national sample of clinicians, this study explores how clinicians use these models in practice. 58 clinicians (38 psychologists and 20 psychiatrists) were presented with a case study referral containing psychometric test results from either the categorical or dimensional diagnostic model of Personality Disorder. Clinicians then completed questionnaires assessing case conceptualization, treatment planning, case prognosis, and perceptions regarding the utility of the models for each of these tasks of clinical judgment. Results will determine the utility of information communicated by each model and how that information is used in clinical practice.

Poster Number 78: Kayla Donaldson, Samantha Walkow

"Bedtime Routine and Sleep Patterns of Preterm Infants"

The sleeping and waking patterns of preterm infants have been studied in numerous contexts due to sleep's critical impact on infant development. This study was interested in the influence of nursing and complexity of bedtime routine on total daytime and nighttime sleep, and on reported night awakenings. It was hypothesized that greater complexity of bedtime routine would be indicative of more hours of sleep and fewer night awakenings, and that nursing during the bedtime routine would be related to fewer hours of sleep and more frequent night awakenings. It was in addition hypothesized that the effect of these variables would yield a stronger association in infants with a younger gestation age. This study was conducted several ways, involving measures obtained at birth, 4 months, 9 months, and 24 months. Parents were given self-report questionnaires and infant sleep-logs, and information was obtained from

hospital records. To measure these effects multivariate ANOVAs and descriptive statistics were run at each age. Nursing and complexity of routine were run in conjunction with gestation age as a covariate to determine the effect on total sleep and night awakenings. Analysis of data showed a significant main effect for the relationship between nursing and night awakenings. At four months, differences were found lending some support to hypotheses about the impact of complexity of bedtime routine on total sleep; however, results did not reach significance. Gestational age, which was run as a covariate, was not found to be significant.

Poster Number 79: Ryan Egan

"Mindfulness in emotion regulation: The effects of state and trait mindfulness on the late positive potential"

Mindfulness has shown potential as an effective emotion regulation strategy and a basis for treatment of multiple psychological disorders. To explore possible psychophysiological correlates of mindfulness during emotion processing, the researchers investigated the late positive potential (LPP), a component of event-related potentials (ERPs) that has been shown to index early responses to affective stimuli. In addition, there is much debate over how best to conceptualize and measure mindfulness, including doubt as to whether trait and state mindfulness scales are measuring the same construct. The present research sought to replicate results showing that individuals high in trait mindfulness show reduced LPPs while viewing emotional images. Researchers also sought to understand how state mindfulness would affect the LPP similarly to or differently from trait mindfulness. Participants first viewed affective images passively under ERP recording. After being instructed to be mindful, participants viewed an equivalent set of images. We hypothesized that participants would show smaller LPPs in the mindfulness condition than in the passive viewing condition for high arousal images. Contrary to our hypothesis, participants showed larger LPPs in the mindfulness condition across image categories. Trait mindfulness was unrelated to LPP amplitude, failing to replicate previous research. Self-reported state mindfulness was unrelated to LPP amplitude and negatively correlated with trait

mindfulness. These findings suggest that state mindfulness engages additional motivational and attentional resources regardless of affective valence. Furthermore, our results cast doubt on the validity of measures of state and trait mindfulness, as well as on the proposed relationship between the two.

Poster Number 80: Thomas Freije , Carley Ernst

"Impact of Boronate Capping Groups on Biological Characteristics of Novel 99mTc(III) Complexes [99mTcCl(CDO)(CDOH)2B-R]"

Myocardial perfusion imaging (MPI) with SPECT radiotracers is essential in the evaluation of patients with known or suspected coronary artery disease (CAD). Previously, our lab reported the heart imaging potential of 99mTc(III) complexes with different ligands (Cl, Fl, N3, and SCN). In continuation, this study was designed to understand how different boronate-capping groups affected heart uptake, myocardial retention, and liver clearance kinetics of these new 99mTc (III) complexes ([99mTcCl(CDO)(CDOH)2B-R] (99mTc-ISboroxime: R = isoxazol-4-yl (IS); 99mTc-MPboroxime: R = N-methylpyridinium (MP); 99mTc-PAboroxime: R = pyrazol-3-yl (PA); 99mTc-PYboroxime: R = pyridin-3-yl (PY); and 99mTc-5Uboroxime: R = uracil-5-yl (5U)). The 99mTc (III) radiotracers were prepared using a kit mixture, and planar imaging was used to compare their myocardial retention times and liver clearance kinetics. The main objective was to maintain a high heart uptake while simultaneously maximizing the myocardial retention and minimizing liver activity accumulation. Using planar imaging studies with Sprague Dawley rats, images were acquired at 0-1 min which illustrated that 99mTc-ISboroxime, 99mTc-PAboroxime and 99mTc-PYboroxime all had high initial heart uptake but like 99mTc-Teboroxime all the new 99mTc (III) radiotracers had significant myocardial washout. Biodistribution studies revealed that the initial heart uptake value of 99mTc-PAboroxime was nearly identical to that of 99mTc-ISboroxime; however, a significantly longer heart retention time for 99mTc-PAboroxime was observed compared to that of 99mTc-ISboroxime. From this study, it was concluded that boronate groups had a large effect on the heart uptake, myocardial retention, and liver clearance kinetics of 99mTc (III) complexes.

Poster Number 81: Seth Herr

"Epilepsy and Activated Microglia"

For the Research-Focused Honors Program, I have been working in Dr. Amy Brewster's lab on epilepsy. In lab we hypothesize that microglia cells in the brain's hippocampus contribute to the neuropathology, as well as the behavioral and memory abnormalities seen in epilepsy. My current project first involves the isolation of microglia cells to achieve a single cell suspension. This allows for further analysis of their properties in control and seizure groups in rat models of induced temporal lobe epilepsy. To further study the inflammatory properties of microglia, activated microglia will be separated from resting microglia using FACS (Fluorescent Assisted Cell Sorting), and then their cytokine profiles will be measured using RT-PCR (Reverse Transcription Polymerase Chain Reaction). Observations from this study will lead to an increased knowledge about the nature of microglia and their role in epilepsy. For example, if FACS reveals reactive microglia in high concentrations in the hippocampi of animals after seizures as opposed to control animals, then it may be possible that reactive microglia play a role in the cellular and memory deficits in animals after seizures. Alternative approaches to treatment of epilepsy can also result from this study. For example, high concentrations of potentially harmful extracellular cytokines and/or chemokines secreted by the reactive microglia could be found by analyzing the obtained single cell suspension. This finding could lead to drug treatment by targeting those cytokines and/or chemokines. Further lab analysis, in either case, will be needed to determine if the detrimental properties of epilepsy are reversed.

Poster Number 82: Christina Howard

"Exploring the links between emotional sensitivity, impulsivity, and personality: Evidence from event-related potentials"

Impulsivity presents significant challenges to public health, with consequences of impulsive actions negatively impacting society through high incidence rates of

substance abuse, reckless criminal behavior, and sexual promiscuity. While there are empirically valid models of distinct personality traits related to impulsivity, we don't have a complete understanding of the link between impulsivity and emotional sensitivity. With evidence that among some individuals, acts of impulsivity are an attempt to reduce negative affect, further exploration of the correlation between personality types, emotional sensitivity, and impulsivity is warranted. To examine this correlation, adult participants (n = 88) passively viewed images ranging in emotional valence (pleasant, neutral, unpleasant) while scalp-recorded brain activity (event-related potentials, or ERPs) was measured. We also assessed personality traits using the UPPS+P Impulsive Behavior Scale and the Five Factor Model Rating Form. The results from a correlational analyses indicated that introversion was associated with a larger early visual brain response (P1) to all picture types. Furthermore, neuroticism was related to a reduced P1 to unpleasant pictures when controlling for neutral pictures. Contrary to our hypotheses, correlations with specific impulsivity traits were not statistically significant.

Poster Number 83: Amber Hunnewell

"Linguistic Relativity in Bilinguals: The Effect of Language-Based Descriptions on Memory"

This study investigated the effect of bilingualism on memory. English speakers and Spanish speakers describe motion events differently; Spanish speakers code for the path (i.e. the man entered the room), while English speakers code for manner with the path in an optional prepositional phrase (i.e. the man walked into the room). We examined the effects of the encoding language of the events on memory in Spanish-English bilinguals, with English monolinguals as a control. We hypothesized that the encoding language (English or Spanish) would determine which aspect of the events the participants would remember more (manner or path, respectively). Participants viewed two sets of 8 video clips that they verbally described. Bilingual participants described one set in English and the other in Spanish. Following each set of videos, participants completed a

memory test that contained questions targeting the path or manner of the videos. The results were explored.

Poster Number 84: Isha Kaul

"Effects of Low-Dose Ionizing Radiation on Gene Expression in the Glutamatergic System"

Medical use of CT scans has prompted concern regarding potential effects of radiation exposure. The goal of this project was to determine adverse health effects of a developmental exposure to low-dose ionizing radiation to the central nervous system. Based on a preliminary study using the embryonic zebrafish model that showed radiation-induced changes in the expression of two glutamate receptor genes, this study assessed expression of eight glutamate receptor genes (gria1a, gria1b, gria2a, gria2b, gria3a, gria3b, gria4a, and gria4b) following larval radiation exposure. Glutamate receptors are linked to cognitive functions such as learning and memory. Zebrafish were bred and dosed with gamma irradiation 5 days post-fertilization (dpf), at four dose levels (0 Gy, 0.11 Gy, 1.0 Gy, and 2.0 Gy). Full-body tissue was collected at 6 dpf and brain tissue was collected from both sexes 4-months post-fertilization (mpf), 8 mpf, and 12 mpf for sex-specific assessment. RNA was isolated from the tissue, then converted to cDNA and analyzed via quantitative PCR (qPCR). Additionally, body length, body weight, and brain weight were measured at 12 mpf. Examination of qPCR data at 6 dpf, 4 mpf, 8 mpf, and 12 mpf revealed no significant changes in expression of any of the eight genes for both sexes; however, a significant increase in brain weight ($p<0.05$) was observed in adult females. Thus, while no significant effects were observed in expression of the glutamate receptor genes, further research is needed to investigate morphological alterations and molecular mechanisms responsible for brain weight increase in adult female zebrafish.

Poster Number 85: Amber Kinney

"Personality Traits Predict Outcomes of Psychological Treatment"

The Purdue Psychology Treatment & Research Clinics (PPTRC) provides assessment and treatment services to the greater Lafayette community. One of

these clinics is the Adult Services Clinic, which is staffed by doctoral students in Clinical Psychology and helps adolescent and adult patients cope with stress, manage relationships, and effectively deal with life. All clients complete a standard assessment battery, including the self-reported CORE-Outcome Measure (CORE-OM) to monitor symptom change at each session, the Five Factor Model Rating Form (FFMRF) completed by the client and therapist to assess adaptive and maladaptive personality characteristics, and other self-reported assessment instruments (e.g., Personality Assessment Inventory). The present analysis evaluates this archival data collected from September 2011 to February 2015. / / Specifically, I examined treatment outcomes, personality change through therapy, and comparing agreement for patient and therapist personality ratings over time. These analyses demonstrated the general effectiveness of the clinic, with average overall CORE scores decreasing over time, with most notable change in the first four sessions. I also evaluated client characteristics, symptom scores, and personality traits to determine their relation with treatment response. Therapist-rated conscientiousness was the strongest predictor of initial client engagement (i.e., completing at least four sessions). Client-rated openness was a significant predictor of time spent in therapy and ultimate treatment outcome. Finally, therapist and client agreement on personality description generally increased over the course of treatment. These results demonstrate therapeutic efficacy and suggest that personality traits may be helpful for predicting treatment response. /

Poster Number 86: Kathryn Kump

"What Was My Partner Thinking! Highly Committed People Re-evaluate Their Aggressive Relationship"

People overlook transgressions by a relationship partner when they adopt their partner's perspective. Can adopting a partner's perspective also cause people to overlook partner aggression? Highly committed participants in dating relationships (N= 94) were asked to imagine a scenario in which their partner becomes verbally aggressive toward them; their perspective was manipulated (partner's perspective, own perspective, no perspective). Participants evaluated their relationship quality both before and after imagining the event. The effect of

the partner manipulation was moderated by how much aggression a participant had experienced with their current partner. Among those who reported relatively high levels of aggression, taking a partner's perspective in an aggressive incident was associated with a greater decrease in relationship quality than taking one's own perspective or no perspective. Among those who reported less partner aggression, the manipulation did not affect relationship quality. These findings highlight limits to commitment and suggest that partner aggression may be too serious of a transgression to be overlooked.

Poster Number 87: Karen Ma

"Resistance Exercise Alters Body Composition and Muscular Strength"

PURPOSE: To examine the influence of 14 weeks of resistance training (RT) on body composition and muscular strength. METHODS: Healthy males and females (age 18-30 yr) were recruited into a RT group (RTG; n = 15) and an inactive control group (ICG; n = 14). RTG completed 14 weeks of progressive, periodized RT 3 days per week, while ICG maintained normal activity habits. Both groups maintained weekly exercise and dietary logs. Measures of strength (8 repetition max (8RM) of bench press, deadlift and squat) and body composition (DXA) were taken and blood was collected prior to (PRE) and following the intervention period (POST). RESULTS: The RTG group improved 8RM in bench press (10.837%), deadlift (14.286%) and squat (9.864%). Age, body weight, BMI, lean body mass were not different at baseline in ICG and RTG and did not change POST. CONCLUSIONS: 14wks of progressive, periodized resistance training results in significant improvements in strength but no changes in body composition in college-aged, healthy adults.

Poster Number 88: Elizabeth Mahan

"Attachment Insecurity Predicts Personal Priorities in Close Relationships"

Attachment insecurity predicts response tendencies in relationships. Anxious individuals exhibit fear of being abandoned, whereas avoidant individuals exhibit extreme self-reliance. The current study examined whether these tendencies translate into personal priorities people have in their close relationships.

Participants (N = 196), recruited through Amazon Mechanical Turk, completed a measure of attachment style; one to two weeks later, they ranked and rated a list of various priority concerns for a relationship and indicated their current relationship quality. Consistent with the hypotheses and relative to more secure individuals, anxious individuals ranked intimacy high and independence lower; in contrast, avoidant individuals ranked independence high and intimacy lower. Consistent with prior research, both attachment anxiety and avoidance predicted lower relationship quality. This suggests that insecurities not only indirectly affect behavior but also enter a person's awareness and direct the types of relationships that insecure individuals seek.

Poster Number 89: Brittany Mihalec-Adkins

"Justification of Prejudice Toward International Asian Students"

Throughout American universities, recruiting students internationally has been emphasized. Though research has examined prejudice toward immigrants, little research examines prejudice toward the increasingly represented group of international Asian students (IAS). We reasoned realistic, symbolic, and group esteem threat are important in understanding prejudice toward IAS. Additionally, we reasoned that the relationship between threat and prejudice may be reciprocal such that feelings of threat result in increased prejudice, which can lead to greater threat. This project tested the effect of realistic threat on prejudice, and the effect of prejudice on group esteem and symbolic threat beliefs. Approximately 150 participants read a memo ostensibly produced by Purdue about a new policy that would give IAS preferential treatment. This memo was designed to induce feelings of realistic threat among these participants relative to those who read a neutral memo. Next, participants were given an opportunity to express their feelings toward IAS and ruminate on their feelings. Participants then completed other measures of threat. Drawing from the Justification-Suppression Model of Prejudice and Integrated Threat Theory, we expect that when realistic threat is increased, participants will report greater prejudice toward IAS. Further, when given an opportunity to rationalize their prejudice, we expect participants to develop additional justifications for their prejudices in the form of group

esteem and symbolic threat beliefs. While previous research has conceptualized threat as an antecedent of prejudice, these results will demonstrate the cyclical relationship between threat and prejudice and the consequences they have on intergroup relations.

Poster Number 90: Courtney Oare

"Volumetric Analysis of Brain Impairment in Parkinson's Patients using Magnetic Resonance Imaging"

Over time, occupational workers in Germany with excessive manganese exposures have shown symptoms similar to Parkinson's disease. Those who are exposed to high levels work in welding, or smelting in the steel industry. Manganese is very toxic if high levels enter the neurological system, even though it is an essential element in neurodevelopment. Too much toxicity can cause damage to cognitive functions including memory, reaction time, with impaired motor control, tremors, and trouble walking- all of which are key symptoms to Parkinson's disease. New research shows that 10-15 years before a clinical diagnosis, olfaction tests can be completed to see if a patient has Parkinson's. Magnetic Resonance Imaging allows the study of changes in brain volume. Changes in olfaction regions of the brain were noticed in Parkinson's disease patients along with manganese-exposed patients. In this study, 40 Parkinson's disease patients underwent MRI's and olfaction testing by the University of Bochum in Germany. By the end of the analysis, 26 MRI's of Parkinson's patients were compared to 14 control MRI's. These images were used to compare the grey matter densities between the patients and controls in certain brain regions. Each image was normalized, co-registered, and smoothed using MatLab and SPM programs. Statistical measures are taken to point out specific areas with a significant loss in grey matter amongst all patients. A statistical analysis was also completed comparing grey matter density to Motor Score and Olfaction Score data from Bochum University.

Poster Number 91: Katherine Pendergast

"How Implicit Attitudes toward Emotion Regulation Influence Partner-Directed Aggression"

Many risk factors related to intimate partner violence perpetration are linked to cognitive and affective processes, such as emotion regulation. The inability to regulate negative emotions, such as anger, leads to a greater likelihood that intimate partner violence will occur. Because daily interactions (e.g. exchanges with a romantic partner) are thought to be completed without effortful monitoring, implicit, or indirect measures of emotion regulation may be better suited to assess automatic or unconscious attitudes toward regulating negative emotions. The current study examined if implicit attitudes toward emotion regulation were related to frequency of aggressive statements or inclinations after relationship-relevant provocation, and if the frequency of these aggressive reactions differ based on if a participant has previously perpetrated violence against a partner or not. Results and implications will be discussed.

Poster Number 92: David Putt

"Evaluation and Control of Pathogens in Healthcare Facilities using Scavenging Systems and Bioluminescence - A Research Study Proposal"

Evaluation and Control of Pathogens in Healthcare Facilities using / Scavenging Systems and Bioluminescence - A Research Study Proposal / / David Putt; Josh Horton; Dr. James McGlothlin; Dr. Bruce Applegate / Purdue University, West Lafayette, IN / / Motivation for this Study: In 2014, a pilot study was conducted by a Purdue graduate student and under the direction of Drs McGlothlin and Applegate to determine if pathogens could be reduced and controlled using a market available scavenging system. As demonstrated in Dr. Applegate's laboratory, the market available scavenging system showed a significant reduction in pathogens compared to no scavenging system. Unfortunately, it could not be determined how much and where the pathogens deposited themselves within the various parts of this scavenging system. Further, the distribution patterns and possible leaks within the scavenging system could not

be determined. / / Objectives: This pilot study, using bioluminescent bacteria, will help us better understand how well the market available scavenging system works, where the bacteria are deposited, where potential leaks are, and if the scavenging system can be improved. / / Methods: Experimental set up and protocol for the capturing of bioluminescent pathogens in a laboratory setting includes setting up and using the head of a "manikin" to generate a bio-aerosol that simulates droplet and droplet nuclei transmission as a patient would when recovering shortly after surgery. Systems will generate, detect and record bioluminescent bacteria for qualitative and quantitative analyses with and without the market available scavenging system. We will perform qualitative (visual) analyses of bioluminescent bacteria inside various components of the scavenging system. The last step involves generating, detecting and recording bioluminescent bacteria for qualitative and quantitative analyses with and without the market available scavenging system using a HEPA filter. Testing should begin April 2015.

Poster Number 93: Brad Qualizza

"Consistent and unaltered expression of glyoxylase 1 (GLO1) during zebrafish embryogenesis and following exposure to the agricultural herbicide atrazine"

Atrazine (ATZ) is one of the most commonly used herbicides in the United States. It is a well-known endocrine disruptor and potential carcinogen. Endocrine disrupting chemicals (EDCs) such as ATZ are linked to adverse health effects including reproductive abnormalities and cancer. The U.S. Environmental Protection Agency (EPA) currently sets the Maximum Contaminant Level (MCL)of ATZ at 3 parts per billion(ppb) for drinking water; however, due to the ability of EDCs to elicit adverse health effects at low levels, it is suspected that detrimental effects can occur below the MCL. Previous studies in our laboratory have shown that the glyoxalase 1 (GLO1) gene and protein is overexpressed at the end of embryogenesis (72 hours post fertilization [hpf]) in the zebrafish model system as a result of ATZ exposure. The GLO1 enzyme functions primarily in cellular detoxification of the glycolysis by-product methylglyoxal (MG). It is suspected that the overexpression of GLO1 serves as an adaptation for rapidly growing and

multiplying cancer cells producing more MG as a result of increased glycolysis. The first aim of this project was to characterize expression of GLO1 during the developmental time course using the zebrafish model system with quantitative PCR (qPCR) at 24, 36, 48, 60, and 72 hpf. Expression of GLO1 was found to be consistent throughout these time points (p=0.2491; n=6). The second aim of this project was to characterize the effects of ATZ exposure on GLO1 expression during embryogenesis at additional developmental time points. Zebrafish embryos were exposed to ATZ concentrations of 0.3, 3, or 30 ppb or a control treatment (aquaria water) through 24, 36, 48, or 60 hpf. Quantitative levels of gene expression were measured using qPCR. ATZ exposure was observed to not alter gene expression at 24 (p=0.4299; n=6), 36 (p=0.3210; n=6), 48 (p=0.3952; n=6), or 60 hpf (p=0.4924; n=3). Overall these results indicate that alterations in GLO1 expression are time-point specific.

Poster Number 94: Nara Shin, Natalie Lamport, Heath Bentley, Andrea Wilkerson, Jay Beltz, Su-Jung Tsai

"Evaluation to Nano-sized Particles and Fibers Released from Paper Shredding"

We investigate exposure of nano- to micro-sized airborne particulate matter released from the shredding of printer papers and associated biological responses. / A crosscut and a straight cut paper shredders were used to perform shredding on two types of printer papers of 40 sheets using four shredding methods, i.e. a single sheet at a time and five sheets at a time continuously and at 30 second intervals to investigate the size distribution of released dust particles. Airborne nanoparticle (NP) concentrations during paper shredding were measured using particle counters Optical Particle Sizer and NanoScan Particle Sizer for sizes of 0.3-10µm and 10-420 nm, respectively. NPs were collected using NIOSH 5000 method gravimetric sampling on quartz filter and Tsai diffusion sampler on polycarbonate filter (0.2µm pore) and TEM grids for particle characterization. / Released particles were found in the size range from nanometers to micrometers in irregular or fibrous shapes as individual or agglomerated particles. The observed airborne particle concentration increase was as high as 4×10^5 particles/cm3 at a particle diameter of 36 nm and most

released particles had diameters less than 150 nm. The collected particles showed a high proportion of particles smaller than 200 nm in diameter or length according to SEM image results. The elemental analysis of these particles identified fibrous material composed of carbon, oxygen, and silicon with minor amounts of sodium, aluminum, potassium, calcium, and titanium. The biological response to such NPs were studied using human cells, more in vitro results will be presented. /

Poster Number 95: Amberly Simpson

"An Unjust Tradeoff: Third-Party Perceptions of Women Who Confront Hostile and Benevolent Sexism"

This research looks at how women are perceived by third party members after they either do or do not confront a hostile or benevolent sexist comment. Participants (N=200) were first presented with a scenario describing an interaction in which a male boss denies his female employee a promotion for either hostile of benevolent sexist reasons. The female employee then responds by either accepting or confronting his decision and reasoning. Participants then answered questions about their perceptions of the warmth and competence of the boss and the employee, as well as individual difference measures such as the Ambivalent Sexism Inventory and measures of gender-specific system justifying beliefs. We hypothesized a three-way interaction for our results. We expect that the previously observed tradeoff in perceptions of women's warmth and competence will hold true in the benevolent sexism conditions so that women who confront are seen as more competent than warm, whereas women who do not confront are seen as more warm than competent. For hostile sexism, however, we hypothesized that this tradeoff will not exist because hostile sexism is perceived negative by others and typically as unacceptable in our society. Thus, because confrontations of hostile sexism are seen as more legitimate and justified, we expect that there will be a main effect for both warmth and competence in the hostile sexism condition where women will be seen as both warmer and more competent when they confront than when they do not.

Poster Number 96: Brandi Smith

"The Relationship between Parental Stress, Multiple Children in Household and Social Emotional Development of Preschoolers"

Adequate social-emotional development contributes to children's ability to maintain healthy long-term relationships. With these skills, children are able to engage and adapt with changing environments (Humphrey et al., 2007). Research indicates that parental stress has a multitude of adverse effects on child behavior problems (Crnic et al., 2005). However, few studies have explored the effect of number of children in the home on child outcomes and whether the effect of stress is different depending on whether the family has one child or multiple. This study investigates whether: 1) number of children in the household and parental stress are related to children's social-emotional health, and 2) the relation between stress and child outcomes depends on number of children in the home. All participants were part of an ongoing research project evaluating the Pre-K Positive Action program focused on social-emotional learning and health. In the study, 71 preschoolers and their parents participated. Mothers were asked to rate the amount of stress in their lives on a scale of normal (1) to very high (4) and how many children were in the household. The Social Skill Improvement System was used to rate social- emotional health and behavior. To analyze the relations between the variables, we examined zero-order correlations. Results indicate that higher levels of parent stress was related to problem behaviors ($p = .045$) and that the number of children in the household was related to social skills ($p = .046$). Unexpectedly, stress and number of children in the home were not correlated.

Poster Number 97: Elizabeth Stremke

"In-vitro Bioaccessibility of Phosphorus in a Mixed Diet"

Phosphorus over-nutrition is a growing concern due to links between serum phosphorus, cardiovascular disease, and mortality. Intestinal phosphorus absorption depends on bioaccessibility of the food source, load ingested, and gut transport capacity. Various forms of phosphorus have different levels of bioaccessibility. Acceptable tools modeling human digestion are needed to

estimate phosphorus bioaccessibility from foods. This study aims to refine an in-vitro method to measure bioaccessible phosphorus in mixed diet samples, and to determine if this method discriminates between known highly bioaccessible sources, and virtually inaccessible sources. / / We designed a protocol based on methods from Argyri (2009), Karp (2012) and Ekholm (2000) that simulates the action of the alimentary canal in humans via oral, gastric, and small intestinal phases. Ground, dried diet sample is incubated with an oral solution mimicking salivary conditions. The pH is adjusted to 2.5 and pepsin added for the gastric phase. For the small intestinal phase, pH is adjusted to 6.8 by equilibrating the digesta to a buffer across a dialysis membrane, and pancreatin, lipase, and bile extract are added. After a final incubation period, the dialysate is collected and analyzed by ICP-OES to determine bioaccessible phosphorus in the sample. / / Mixed diet sample standards will be spiked with disodium phosphate or sodium phytate at low, medium, and high levels, and percent recovery calculated. Unspiked mixed diet and wheat flour standard reference material will be used as controls. We hypothesize that we will have high % recovery of the disodium phytate, and low-to-no recovery of the sodium phytate. /

Poster Number 98: Claire Tighe, Michelle DeVilbiss

"Detection and Control of Pathogens in University Computer Centers"

Detection and Control of Pathogens in University Computer Centers / / Michelle DeVilbiss1, Claire Tighe1 Undergraduate, Heath Bentley, IH, Graduate Student1 / James D. McGlothlin, M.P.H., Ph.D., C.P.E1, Advisor, Bruce M. Applegate, B.A, Ph.D2 / 1School of Health Sciences, College of Health and Human Sciences, Purdue University, 2Department of Food Sciences, College of Agriculture, / / Purpose / / Previous studies have shown that public surfaces such as computer keyboards, remote controls, and door handles serve as reservoirs for transmission of pathogens. The purpose of this study is to determine the types of bacteria present on Purdue university ITAP computer keyboards with the aim of promoting public awareness of the need for improved cleaning policies. / / Methods / / Five computer keyboards from ten iTap labs across campus (MSEE, WTHR, BRNG, HICKS, LILY, HAMP, STEW, MATH, MERE, MTHW) were swabbed with a cotton ball

and sterile water. Each cotton ball was sub cultured onto six different types of agar selecting for various types of bacteria commonly found on the human flora, fecal matter, and public surfaces. To confirm the presence of growth, swabs were sent to EM labs through Purdue's Radiological and Environmental management department. Cultures from plates that showed growth were run through 16S Polymerase Chain Reaction (PCR), gel electrophoresis, and ethanol precipitation in preparation for further sequencing and identification. / / Results / / Results from EMlabs confirmed the presence of gram-negative rods, gram-positive cocci, and bacillus on the keyboards. The process of 16s PCR, ethanol precipitation, and Sanger Sequencing are still in process and pending results. / / Discussion / / The growth of bacteria on the keyboards demonstrates the potential transfer of pathogenic bacteria between users and pose as a potential threat to student and faculty's health. By improving sanitation methods and public awareness of pathogenic bacteria on keyboards, the risk to student and faculty's

Poster Number 99: Kendal Weger

"The Effect of Arsenic Concentration of Water on Rice Samples"

Arsenic is a toxic metalloid that is present in the environment from both natural and anthropogenic sources. Arsenic in drinking water is currently a large problem in countries such as Bangladesh, China, India, Nepal, Argentina, and Mexico. In addition, arsenic is also reported to be found in some food sources including rice. In many of the countries facing arsenic contamination in drinking water, rice is a staple food resulting in potential exposures from multiple sources. Based on this information, the hypothesis of this study was to test if rice soaked in water laced with arsenic would contain higher levels of arsenic than rice soaked in water without arsenic. Three objectives were completed to test this hypothesis: (1) establish an analytical protocol to measure the arsenic concentration in rice, (2) determine the concentration of arsenic in rice, and (3) determine if rice soaked in arsenic-laced water would possess higher levels of arsenic than rice soaked in water without arsenic. First, a protocol using inductively coupled plasma mass spectrometry (ICP-MS) was created and optimized to analyze arsenic concentrations in rice samples. Second, the concentration of arsenic in jasmine

rice was determined using this protocol and was 3538 ng/g. Lastly, long grain rice samples were soaked in water containing either 0, 10, 100, or 200 ppb arsenic for 30 minutes, allowed to dry, and then arsenic concentration determined using the ICP-MS protocol. Arsenic concentrations ranged from 1969-2455 ng/g and were not significantly different among treatments (n=4, p=0.2692). Arsenic concentrations of the treatment water (0, 10, 100, and 200 ppb) were also analyzed and were slightly higher than the target concentrations (0, 37, 246, and 393 ppb, respectively). Overall after experimentation, the hypothesis was disproven with the rice samples soaked in arsenic-laced water not containing significantly higher levels of arsenic than the rice samples soaked in water without arsenic.

Poster Number 100: Anna Winchester

"Effects of a Developmental Atrazine Exposure on SIK2 Expression"

Atrazine is a widely used agricultural herbicide in the Midwestern United States. Although the US EPA has set the Maximum Contaminant Level (MCL) at 3 ppb in drinking water, it is suspected that these levels can have adverse health effects. Atrazine is a suspected endocrine disruptor. Endocrine disrupting chemicals can change endocrine function and cause adverse effects at the level of the individual, its progeny, and subpopulations. In an ongoing study in our laboratory, transcriptomic analysis revealed expression alterations in genes associated with neuroendocrine and reproductive system development, function, and disease; cell cycle regulation; and carcinogenesis following developmental atrazine exposure at 0.3, 3, or 30 ppb throughout embryogenesis in the zebrafish model system (1-72 hours post fertilization [hpf]). SIK2 is one of the genes shown to have increased expression, along with an increase in protein expression at 72 hpf following exposure. SIK2 localizes on the centrosome and plays a key role in regulating the onset of mitosis. SIK2 also mediates the expression of microphthalmia-associated transcription factor (MITF), a regulator of melanocyte development. The goal of this project was to first characterize the expression level of SIK2 throughout embryogenesis of the zebrafish using quantitative PCR. In addition, the quantitative level of SIK2 expression at additional embryonic time

points after atrazine exposure was defined. Analysis of the developmental time course through 72 hpf showed expression of SIK2 was relatively stable with no statistical differences observed among the time points analyzed (p=0.0711; n=6). Moreover, no statistical differences were observed in expression at the additional embryonic time points following atrazine exposure (24 hpf: p=0.0596, 36 hpf: p=0.4104, 48 hpf: p=0.2148, 60 hpf: p=0.2822; n=6) indicating expression alterations associated with embryonic atrazine exposure at the time points analyzed were specific to 72 hpf.

Poster Number 101: Jerry Wu, Andrew Colby, Jay Beltz

"The aerosol particles to be generated from various powders for insulation applications"

Various types of powder used as insulation materials were studied for objectives: 1. To determine the size distribution of particulates from different powders when agitated 2. To provide particle release data to aid in developing exposure assessment studies associated with powder usage and biological responses. / A shaker was used to shake four powders, i.e. Aerogel, Mineral Wool, Calcium Silicate, and Perlite in bottles at a constant speed for 10 minutes in a Class 100 clean room at Birck Nanotechnology Center. The bottle containing powder was enclosed and connected to sampling tube at the top opening to measure released particle concentration and size distribution. Airborne nanoparticle concentrations were measured using a Optical Particle Sizer (OPS) (TSI, Model 3330, 0.3-10μm) and a NanoParticle Sizer (SMPS) (TSI, Model 3910, 10-420 nm). / The particle sizes detected below 420 nm for Aerogel, Mineral Wool, Calcium Silicate, and Perlite showed mode size at 27/154 nm, 154nm, 20/65nm and 15/115nm, respectively. Particle sizes above 0.3 μm, mostly above 1 μm, were also detected during shaking these four samples. Several readings have peaks before and directly after the 10-minute shaking period where an increased particle concentration was released due to moving the sampling bottle. / The agitation from moving sampling bottles caused a greater release of particles than that of the shaker. Movement at a higher shaker speed will produce more uniform

distribution of particle concentration that provides more insight to the behavior of the powders. /

College of Liberal Arts

Poster Number 102: Benjamin Abbett

"Active Learning Center"

This project began with directive of researching the architecture of the Active Learning Center that is being built in the center of Purdue's Academic Campus. Interview questions were being developed to ask the design professionals who created the wide variety of spaces from the public study areas to the lecture halls. One of the areas; however, that stood out among the rest was the inclusion of Makerspace in this new active learning environment. It was quickly realized that the concept of a makerspace has been widely talked about lately, but there has been little research into the design of the physical facilities and what makes them successful. With the concept of active learning environments at the forefront, the research has taken to finding out what are the factors of design that create a successful makerspace. The two makerspaces that are being specifically looked at in depth are called LVL-1 and First Build. Located on a college campus in the Midwest, both of them have them can be accessed by the same general population of young minds, but have taken two very different approaches in the design of their facilities. Through the use of personal interviews, and a sight condition report and measuring, a user survey will be developed to collect quantitative data that can be translated to determine the successful and non-successful factors of the facilities.

Poster Number 103: Mary Adkins

"Societal Influences on the Revisions of the Classic Nancy Drew Mystery Stories"

This thesis explores the revisions made between the 1930s and 1960s publications of the first 34 books of the Nancy Drew Mystery Stories and society's influences upon those revisions. The revisions were made to update and shorten the stories for modern day readers, but also to remove negative stereotypes.

Through close examination of The Secret of the Old Clock, The Secret at/of Shadow Ranch, and The Haunted Showboat, the revisions of both details and character identities are clearly visible. I argue that the revisions did not fix those negative stereotypes by deleting them, and that in the process of updating the stories, also restricted female agency.

Poster Number 104: Lily Anderson

"The criminal burial"

Identifying a criminal, without further classification, does little to inform us about their specific crime. With this in mind, I undertook an overview of recognized criminal burials in archaeology and historical literature and sought to separate them into three classes based off cultural factors, cause of death, and grave features. Being able to identify these individuals' crimes and understand the historical and cultural context surrounding their deaths is the first part in learning their story. I believe the three classes I have defined can provide a new way to describe criminal burials and is both informative and efficient for interpreting burials. / /

Poster Number 105: Hannah Bays

"Menstruation and Deep Placentation are Correlated Primate Traits"

Menstrual bleeding is a feature present only in a few species of mammals, many of which are primates. Several evolutionary hypotheses have been developed to explain this otherwise wasteful feature of female physiology. We hypothesized that menstrual bleeding actually reflects aspects of the uterus related to whether a species has a "deep" or "shallow" placenta. We tested this hypothesis using menstrual bleeding data collected from 640 individual primates at 29 different zoos in the United States, representing 69 different species of primates. We compared these data to information on placenta type from the primate literature. We found that species with deep placentas were more likely to have externally visible menstrual bleeding ($P < 0.001$). We also found distinct differences in menstrual bleeding between groups of primates, with primates that are more closely related to humans being more likely to have externally visible menstrual

bleeding. Our results indicate the menstruation is a consequence of the development of the placenta, and likely has no significant function on its own. Since reproduction is an important aspect of evolution by natural selection, menstrual bleeding clearly was critical to the evolution of many primate species, including humans. Therefore, rather than being "wasteful", menstruation should be understood as part of what makes us primates. / /

Poster Number 106: Jill Bosserman

""Working Night and Day to Win the War": The Entrance and Exit of Women into the British Workforce of World War One"

When World War One ended in 1919, thousands of newly / empowered women were left unemployed. Labor contracts / between industries and the British government, which had / allowed women to work in historically male positions, expired, / forcing many women from their jobs. Contemporary scholars of women in the First World War largely argue that / women's economic and social gains as participants in Britain's wartime workforce were, like their employment agreements, / temporary. Although current scholarship correctly recognizes that increasing women's employment was indeed a temporary measure, I believe it underestimates the importance of this employment. I argue that as a vital part of the structure and functioning of the British state during the First World War, women in Great Britain were empowered economically, psychologically, and socially through participation in Britain's wartime workforce.

Poster Number 109: Shawn Carr

"The Environment: The Forgotten Casualty of War"

Governments measure the costs required for war. They weigh the number of soldiers required versus the number that may be lost. They inquire to know how much financial risk will be involved in the campaign. They also want to know how long the war will last. Once these are known, States decide whether it is advantageous to commit to a war. However, there is a forgotten casualty States rarely think about, the environment. Although literature has progressed in explaining the impact war has on the environment, little comparative analysis has

taken place to determine if different types of war lead to different consequences to the environment. This paper explores the relationship between war and the environment and argues war not only has a detrimental impact on the environment, but different types of warfare, like guerilla versus conventional, make a difference on the type and extent of that impact. I test my hypotheses using qualitative case-studies of war in Rwanda, Vietnam and Iraq since each provides a unique comparison of different types of warfare. I expect to find conventional war poses a greater threat to the environment than guerilla warfare, but that guerilla wars carry with them their own unique set of environmental consequences. The findings add to our understanding of the impact of war on society and the environment /

Poster Number 110: Shannon Connors

"Electoral Reform in Ecuador: The Obstacles to Citizen Representation"

Ecuador passed an electoral reform in 2009 that adopted the rare 'free list' proportional representation system for selecting representatives to the lower house of the national legislature. A free list allows the voter to cast 'preference votes' for multiple candidates across different parties. A voter has as many votes as there are representatives in the district; districts vary from 2 to 17 representatives. (Alternatively, the voter can cast one 'list vote' for a party). We examine district-level electoral data from the lower house elections of 2009 to understand voting behavior under the new electoral system, with a particular interest in how the complexity of the electoral choices leads to biases against voters in large districts. We compare the rate at which voters use the preference verse list option. The rate is especially influenced by voter cognitive limitations, but other factors also matter: preference voting is least common in districts with many seats, in overseas districts, and in districts with a dominant political party. We also study the conditions under which voters underutilize their preference votes. This rate is effected by the number of seats in the district, party traits, and voter's cognitive limitations. Finally, since the electoral system gives different voters different numbers of votes, counting up votes is an invalid way to

determine a party's electoral strength at the national level; thus, we adopt the concept and methodology of a 'fictional voter' to report for the first time the aggregate national party level election results for the 2009 legislative election.

Poster Number 111: Ana Carolina Corey

"French Phonetic Aquisition"

This study is a multifaceted look at the effectiveness of education of French. The first part looks at the role of teaching in a learners' appropriate use of liaisons. My role in the research is to correct the tasks used to measure the understanding of liaisons and to record the data. The progress of the students with varying levels of exposure and practice to liaisons are being tracked and compared. The second part investigated the effectiveness of the pronunciation instruction on advanced learners of French. Using PRAAT, a computer software used for the analysis of spectrograms, I segmented certain words from audio files, following a script. The pronunciation is recorded and evaluated periodically to gauge the efficiency of the instruction they are receiving. /

Poster Number 113: Emily Durkin

"Pop Culture Depictions and Social Class on the RMS Titanic"

The image and details of the RMS Titanic have transcended time through popular culture depictions that continue today. It is through the lens of social class that I will explore the social stratification on the RMS Titanic and how it has evolved through time in depictions of pinpointed popular culture episodes. I will be writing in terms of social history looking at public perceptions and depictions of class and how they changed over time. Beginning with the initial sinking and social climate on the ship, and traversing four popular culture upsurges in history, I will explore the various ways class was depicted among media and popular culture sources. Popular culture depictions of the RMS Titanic have evolved through time illustrating a change in focus on social class depictions. Tentatively, I will argue that social class depictions of the RMS Titanic have changed over time to paint the third class passengers in a much more favorable light than they were given after the initial sinking. The first wave of popular culture depictions conveys only first

class passenger perspectives. It is only beginning in the 1950s that third class passenger accounts are heard on a larger scale. With other popular culture depictions in the 1980s and 1990s, the third class passengers became the unsung heroes in these depictions.

Poster Number 114: Zane Eggett

"Multimedia Publishing - Archaeological Research"

Several indigenous groups in northwestern North America used native copper prior to Euro-American contact. The Arctic, Subarctic, and Northwest Coast culture areas all have archaeological finds and geological sources of native copper. This research aims to provide an analysis of the possible roles of native copper in northern Athabascan and northern Tlingit society. Native copper was used in a variety of contexts, both as practical and prestige technology, and also possessed animacy and agency, two important and closely intertwined concepts in the ontology of northern hunter-gatherers.

Poster Number 115: Talitha Fischer

"The Mayangna Language Project"

The IELLab strives to intersect the goals of formal theoretical linguistics with the needs of communities speaking indigenous, minority and endangered languages. This is a multi-faceted project dealing with all aspects of an endangered language and is framed within the research activities of the Indigenous and Endangered Languages Lab (IELLab). Endangered languages present a very specific and at the same time complex linguistic situation. Some duties of undergraduate RAs include the following: introducing the English translations in a Mayangna-Spanish dictionary, adapting the materials already collected into a web-based interface, designing a website on the work conducted on the project, diagramming school materials, and coding language samples. This project's focus at the Purdue lab at the present time is studying the structure of Mayangna in several children's stories from the history and culture of the Sumu people. This and other such projects lead to discoveries about the morphology, lexicology, and syntax of the language. In Nicaragua there is also a hands-on project between the faculty leader

and the native tribe studying the language through the study of medicinal plants from the jungle. One of the key methods in this research is the utilization of the native people as teachers, not only to show respect, but The best way to study an endangered, minority, indigenous, un- or under-described language is if a speaker of the language is also the linguist working on it. One of the main goals of the IELLab is to train speakers of the languages so that they can become the linguists of those languages. /

Poster Number 116: Jaclyn Guenther

"Strength and Leadership"

I worked with Professor Laura Zanotti and contributed to an anthropological project that has been collaborating with community members in Barrow, Alaska. This project has been examining their rapid and intense cultural changes. Some of these changes include vocational and educational opportunities, oil and gas exploration, and more. I began by going through CITI training and exploring other research strategies. After becoming familiar with different research programs, I then read several different articles and books that chronicled Alaskan history, including a biography of Alaskan native Sadie Brower. I used what I had learned from the readings to begin documenting, coding and analyzing newspaper articles pertaining to the Alaskan culture. The articles were organized using NVivo, a qualitative analysis computer program, and later shown to the other researchers involved in the overall project. Once the articles were coded, I chose six codes of which best exemplified the Alaskan communities: leadership, strength, community, healing, sharing, and values. Professor Zanotti took my final presentation with her as she traveled to Barrow, Alaska in February 2015 and showed it to the fellow members of the community in order for them to get a better understanding of this project's central focus. Although I will finish my internship at the end of this semester, this project will continue to explore the changing culture in Alaska.

Poster Number 117: Brooke Halteman

"The Rhetoric of Africa"

So often the stories that inspire history books get forgotten behind the presentation of facts. This lack of narrative can leave the reader to be uninterested, unengaged, and unwilling to let history transform their daily thoughts. During my internship in South Africa working for the world's largest Christian radio station, Trans World Radio (TWR), my project was to write a history book of the organization's 40 year presence in Africa. After reading through previous TWR publications and essentially falling asleep at the presentation of facts and lack of engaging stories, I decided to take a storybook approach to the project instead of another count of historical facts. In order to do this, I focused on people. Humans are able to connect with stories about each other—not with dates and technical advances. I still had to consider these things, but focused on the events in TWR history that had the largest impact on people in Africa. My goal was to create a book that would be sent out to TWR donors to encourage them that their money was making a difference in people's lives, so I researched how TWR has been able to reach those in the midst of civil wars in Angola and Mozambique, how programs help mistreated women find their dignity, how the radio station has had a direct impact on individuals who have written to TWR, and other topics with the same sentiment. This information was gathered from old publications and newsletters, listener testimonies, internet research, and personal interviews with TWR staff and listeners from a village in Swaziland. After gathering the stories that personally touched me, I organized the book in a coherent progression of stories and topics, while writing it in storytelling language rather than dryly recounting historical facts. The result was that 1,000 books were printed and distributed to TWR donors, staff, and listeners in Africa, as well as a published online PDF that is accessible to anyone. The goal of the book is to show how the radio ministry has been blessed and has also blessed others, which will hopefully encourage and inspire donors to continue to support TWR.

Poster Number 118: Lauren Haslem

"War Neuroses: How Twentieth-Century Industrial Warfare Shaped the American Hero"

The First World War (1917-1918), the Second World War (1941-1945), and the Vietnam War (1965-1975) all serve as benchmarks in psychiatric literature in which different terms, diagnoses, and treatments were employed to describe a form of mental illness characterized by the onset of anxiety, depression, aggression, and fear following combat experience. Despite psychiatrists' acknowledgement of neuroticism in soldiers and veterans, public recognition among civilians of war neurosis* varied throughout the twentieth century. In looking at American media sources we see two contrasting developments. During WWI and WWII war neurosis is treated with urgency, described as a noble sacrifice to the cause of war, and the responsibility for soldiers' recovery is placed on the US government. There was then a major shift in rhetoric and opinion during the Vietnam War about neurotic soldiers and veterans; they were criminalized, harassed, and neglected. In this paper I argue that these opinions about war neuroses did not exist in a vacuum, but social recognition of this psychological condition was dependent on public opinions about the character of war. It was that recognition, or lack thereof, that created a standard of empathy afforded to neurotic soldiers and veterans. I hope, through this thesis, to contribute to the historical conversation of how subjective opinions have influenced objective realities.

Poster Number 119: Andrew Head

"Learning (to teach) with technology"

This project examines dually the beliefs pre-service English teachers hold about the use of technology for teaching and learning and how those beliefs compare to their actual use of technology for teaching and learning. With many secondary schools involved in 1:1 initiatives, that is, all students are issued laptops or tablets, teachers are increasingly expected to incorporate technology into their teaching on a daily basis. Often, teachers are expected to understand how to

integrate technology into their subject matter with little previous experience or current support, a situation that increases the importance of teachers' personal beliefs about, experiences with and understandings of technology. To come to understand the perception and incorporation of this technology, different open-ended reflections were employed to solicit beliefs and opinions from students that took an English education methods class in the Fall 2014 semester; the students were pre-service teachers (i.e., undergraduates in a teacher preparation program) learning to teach the English Language Arts at the middle and high school level. During the semester, the pre-service teachers used an assigned iPad mini to complete various course assignments in order to interrogate their understandings of technology for teaching and learning secondary English Language Arts. During the Spring 2015 semester, the students will be student-teaching in high schools and middle schools that utilize such technology, and their perceptions will be solicited during and after this experience. The current study is ongoing. /

Poster Number 120: Eden Holmes

"Not a "Black Disease" - Reducing Racial and Ethnic Misdiagnoses in Psychiatry"

Epidemiological research has repeatedly found that there is no scientific predisposition to certain mental illnesses based on race. However, psychiatry statistics demonstrate a tendency for certain mental illness diagnoses to appear disproportionately between racial and ethnic groups, indicating intensive, often subconscious biases within the psychiatric diagnostic community that affect the attribution of significant medical labels in an inappropriate manner. Following the exposition of intrinsic bias within the system, I investigated the rates of mental illness attribution to different racial and ethnic groups and explored the impact of such disparate diagnoses. I identified various possible causes and roots of such internal, subconscious bias among diagnostic professionals, and assembled a series of potential policy suggestions geared towards reducing and eliminating racially and ethnically disparate diagnoses in the future.

Poster Number 121: Yexin Huang

"Pros and Cons of Co-education"

Starting at late 80s to the early 90s, co-education was first introduced in to the U.S. higher education, and there raised a lot of controversies on that discourses. This research paper focusing on gathering different voices from both advocates and opponents on the co-education controversy. The general historic flow of co-education is also covered in this paper.

Poster Number 123: Zeynep Kart

"Cancer Communication Between Patients and Partners"

I conduct exploratory search of the types of questions that breast cancer patients and partners ask in the surgical decision-making visit. I work with Professor Venetis to better understand the communication between doctors and patients.

Poster Number 124: Jiwu Lee, Erin McConkey

"Multilingual Acquisition"

The GOAL of this project is to model how natural acquisition of Language proceeds to create multiple mental grammars in multi-lingual children. The focus populations are: Spanish-English, Chinese-English and Korean-English [5-14]. This sub-project concentrates on the early acquisition of English by young children with an initial grammar of another Grammar [especifically, CHINESE-ENGLISH]. The subcomponents of Grammar that are targeted for the study are: Wh-Question Formation (Wh-Movement) and Auxiliary Movement in Questions (T-to-C Movement). / Methodology. Two types of Data Collection take place: (a) spontaneous speech production by children in naturalistic set-up; (b) experimental set-up (puppet show) specifically targeting wh-structures. Children interactions with an adult (or other children) are video-recorded. Recordings are transferred to a computer and transcribed using specialized software (ELAN). Language data are coded for the relevant linguistic properties: Non-target productions (aka, 'errors') are identified and coded. / Results thus far confirm Park (2008, 2011) and show (a) a three-stage process of acquisition for Aux-

Movement in Questions and (b) no significant effect in the acquisition of Wh-Movement in the populations examined. / This research embeds itself within the activities of the Indigenous and Endangered Languages Lab (IELLab). / References. / Park, S. 2011. The Acquisition of Wh-questions and Auxiliary Movement by Korean-English Bilingual Children. Ph.D. Dissertation. Purdue University. / Park, S. 2008. Crosslinguistic Influence in Korean-English Bilinguals: Wh-Question Formation. MA Thesis. Purdue University. / /

Poster Number 125: Catherine Lemer

"Innovative Science Communication Practices"

In this project, we are focusing on the communication patterns of scientific bloggers from the Public Library of Science. We are examining and analyzing what strategies these bloggers use in order to convey their message to the internet masses, and which are found as the most efficient. We hope to come to an understanding of how their communication patterns have been altered from their standard level to explain complex science to the broader audience in the blog atmosphere, intellectuals and the general public alike. Thus far, we have discovered the indication of rhetorical patterns we have identified as 'moves,' and are looking to further delve into which pattern of moves is most prevalent in the blog data we have collected. / / (Please disregard previous submissions of this application.)

Poster Number 126: Michael Lockman

"Ceramic Analysis at Cerro Tortolita"

Investigation endeavors to discern the nature and chronology of Cerro Tortolita, a pre-Hispanic archaeological site located in the Upper Ica Valley of the Southern Nasca Region outside of Ica, Peru. The site dates primarily to the Early Intermediate Period (ca. 100 BCE - 600 CE) and consists principally of a large public plaza surrounded by a U-shaped platform mound. Ceramic analysis from 2014 excavations atop the mound should help determine the site's function and occupation providing valuable information by which we may better understand the pre-history of the ancient Andes. It would be pragmatic for future

investigation to include other sectors of the site in order to postulate more holistically the excavation area's function relative to the broader context of the site.

Poster Number 127: Katie Martin

"The Earhart Brand"

Before leaving on her failed 1937 flight around the world, Amelia Earhart praised her husband and publicist, George Palmer Putnam, for his promotional abilities by saying, "I know I'm lucky to have him, for I never could do it without his help. He takes care of everything." The celebrity culture of aviation in the 1920s and 1930s was serious business. In the pioneering age, both record-breaking flight successes and failures resulted in good copy for newspapers. Mishaps and "firsts" further perpetuated the public's obsession with flight and "the winged gospel." Media men like George Putnam jumped at the opportunity to involve themselves in the world of aviation. Putnam doggedly created an identifiable, enduring, and marketable trademark for Earhart. He cultivated this "Earhart Brand" as a heightened version of her true character; because without Earhart's own work ethic, eloquence, and activism, there would be nothing for him to market. Although Earhart's entrance onto the stage of celebrity was circumstantial and subsequently manufactured by George Putnam, she transformed herself into a public personality in her own right. Earhart and Putnam worked together to establish and maintain her place in the spotlight.

Poster Number 128: Kathryn Math

"An Ethnography of Tailgating at Purdue University"

The football-associated act of tailgating, though thought by many to simply be an excuse for binge-drinking, is actually a complex social practice with a stress placed on social bonds and rank. Rank in this context is equivalent to the pride and status that is perceived to be associated with accomplishing certain tasks. The tailgate provides an area where one can achieve certain social bonds not afforded in the context of normal day-to-day life. / This study, based on the participant observation of tailgates at the campus of Purdue University, examines several

values stressed by tailgaters and how these are displayed in the physical set up of tailgates. Of special note is how the desire for convenience led to the creation of all-in-one tailgate vehicles. By understanding the intentions of tailgating and the resulting displays, Purdue University may seek to change parking and game day practices to improve the experience for all involved. /

Poster Number 129: Andrea Matio

"American Representations in the Middle East: Captivity Narratives in Silent American films"

According to the leading historiography, The Sheik (1921) began American's love affair with Orientalized Arabs. Captivity narratives, such as The Sheik, come from a long history of Orientalizing the Middle East. Orientalism is the perpetuation of stereotypes that Arab lands and people are backwards, barbaric, unintelligent and in need of help from the West. During the height of silent, black-and-white films The Sheik played on Oriental ideas of the Middle East and North Africa along with American gender roles at the time to construct a romanticized captivity narrative. But before The Sheik there were films like Captured by Bedouins (1912), Bound in Morocco (1918), and Son of Tarzan (1920) all exhibiting captivity of westerns by Arabs through a wide variety of narratives. This research is still in the beginning stages and will be followed up with archival research in June 2015 due to the delicacy of the films.

Poster Number 131: Jonathan Micon

"Prehistoric Lithic Analysis and Typology"

Current research estimates that humans have inhabited what is known today as Indiana for around 12,000 years. During this time, early people developed various means of interacting with the environment around them. Evidence of these activities is found through a number of lithic stone tools that are left behind in agricultural fields, river bottoms, and other erosion prone areas. Each artifact tells a particular story about the subsistence strategies and lifestyles of these earlier people. Although the personal gathering of these cultural resources is highly ill advised, lithic remains offer professional archaeologists an important insight into

the practices of earlier populations. Recently, a collection of lithic remains was brought to the Purdue Anthropology Department by a local resident. As a two semester project, I have been assigned the task of designing a database that will catalog information based on these objects in a clear and concise manner. The information that I assemble will then be used to educate future students in the diversity of Midwestern Native traditions. By interacting with physical prehistoric material, students will be able to develop a better connection and understanding of past people and environments.

Poster Number 133: Jordan Paine

"Farm to School"

The Farm to School research is focusing on the politics behind how Farm to School is organized, ran, and implemented. Thus far, research has consisted of literature reviews, policy reviews, meetings with a political consultant, and interviews with food service directors in the local area. Plans have been made to visit policy makers in the capital building and speak with those who have worked on farm to school grants in Indiana. The research thus far has shown that the farm to school federal policy leaves state's with a lot of autonomy on deciding how the program is managed and run. After discovering this, the research then began to focus on Indiana Farm to School policy. The main focus of this research is based on local Farm to School, Tippecanoe School Corporation, West Lafayette School Corporation, and the Lafayette School Corporation, with considerations of the school corporations that spend a considerable portion of their money on local foods. Perspectives of major stakeholders and their reasons for being major stakeholders are also examined in this research. The Farm to School Research is ongoing and it is the goal to gain a broader understanding of how the federal and state policy work within school politics to bring fresh, healthy, and local foods to the plates of students in the school lunch program.

Poster Number 134: Katherine Reichart

"Amusement Parks:Safety in the Face of Error"

This project reflects on the safety of amusement park riders. The study consists of a ten question pilot survey distributed in both traditional and cyber methods. The population is of a group of nearly 40, consisting of mainly undergraduate students. The survey displayed choices between icons, statements, and statements or icons in the form of a limited Likert scale. Results from the survey are varied but show an obvious trend in the nature of understanding rider guidelines. The results show a strong correlation between minimalist statements or icons and reader comprehension. Possible uses for the results include expansion and continuation of research.

Poster Number 135: Krystie Ritchey

"Building the Purdue Second Language Writing Corpus: processes and implications"

This project describes the process of building a local corpus of L2 writing to inform the audience about the detailed procedure and necessary steps taken in the process, as well as implications and benefits of a local corpus for researchers and practitioners in the field of second language studies. To create the corpus, several processes were developed and implemented. This corpus, titled the Purdue Second Language Writing Corpus, consists of approximately 2500 essays written by students enrolled in a first-year composition course specifically designed for international students at Purdue University, beginning with the Fall 2014 semester. These include converting the original essay files into text documents, de-identifying student essays by creating unique identifiers for each essay, and encrypting and password-protecting all files and folders and securely storing them. I provide detailed explanation about the process of building a local corpus of L2 writing. Documenting the building process informs research in a way that allows researchers to be able to provide more specific contextual information, methods of construction, and resources used in the building process, thus, help explain the validity and reliability of data, and describe the representativeness,

balance, and size of the corpus. Rich contextual information about a local corpus can better help researchers analyze and interpret the data, which is a crucial factor in corpus research and its use. Current and future research involving the corpus will also be discussed.

Poster Number 136: Chelsea Rose

"Not Quite Equal in Their Right to Fight: The American Media Response to the Sexual Assault of Rhonda Cornum During the First Gulf War"

I examine the consequences of false media reporting about Rhonda Cornum's experiences as a POW in the First Gulf War. While she denied it, media outlets reported that she was raped, bringing significant attention to the controversial topic of women's roles in the armed forces.

Poster Number 137: Rachel Shea

"An examination of skeletal injuries at Tombos, Sudan: Investigating the effects of sociopolitical changes on violent and accidental trauma in Nubia."

This study investigates the rates and modes of injury through the analysis of skeletal remains from the site of Tombos at the Third Cataract of the Nile in Sudan during the Napatan time period (~750 – 660 BC). The region in which Tombos is situated was under Nubian control during the Napatan period. Our comparative sample from Tombos dates to the New Kingdom period (1550 – 1050 BC), during which Nubia was colonized by Egypt. Through the analysis of traumatic injuries in skeletal remains we can explore the interaction between two distinct cultures. We analyzed the crania and limb bones from ~30 intact burials and other commingled remains. We included only adults in our assessment and calculated an MNI of 53 individuals. The limb bones and crania were examined for Myositis ossificans, fractures, and dislocations and were recorded according to bone type and side. The Napatan sample injury frequencies are: Crania - 6.3%, Humerus - 4.2%, Radius - 5.9%, Ulna - 12%, Femur - 1.02%, Tibia - 7.8%, Fibula - 1.3%. These rates are higher than the New Kingdom sample, which are: Crania – 1.4%, Humerus – 1.4%, Radius – 2.9%, Ulna – 4.9%, Femur – 1.4%, Tibia – 1.6%, Fibula – 1.5%. Evidence of violence, ascertained via cranial injuries and forearm fractures

indicates a slight increase in interpersonal violence over time at Tombos. Additional higher frequencies may be related to the hypothesized change in daily activities and subsistence, as indicated by skeletal markers of activity from the New Kingdom Egyptian colonial rule to the Nubian Napatan polity.

Poster Number 138: Marisa Smith

"Oral Presentation Skills in Interior Design and Architecture"

Good communication skills are possibly the best attributes that an Architect or Interior Designer can attain throughout their career. It would be impossible to make a client happy if the designer couldn't adequately explain their design ideas, and implement just what the client desires. The purpose of this research is to find out what defines those good communication skills, and to share with designers and architects this definition so that they can achieve success through their career.

Poster Number 140: Eric Stocking

""The Ladies' Gunboat:" Confederate Charleston and the Union Blockade, 1861-1863""

This project centers on the Ladies Gunboat Society of Charleston, South Carolina, and the effects of gunboats they fund on the city of Charleston and the ongoing Civil War. Specifically, I am referring to the CSS Chicora and the CSS Palmetto State, both constructed within the city of Charleston from March to December of 1862. These vessels were funded primarily by the women of Charleston, but also by citizens across South Carolina and later even the Confederate government. There were other similar societies across the South at the height of the war in major southern cities, such as Richmond, Savannah, and Mobile. What spurred this fundraising effort and construction of the ships was the Battle at Hampton Roads, VA; between the two ironclads USS Monitor and CSS Virginia in early March of 1862. The Confederates, strapped for naval resources, sought to raise these homegrown vessels, ironclad gunboats to be specific. The purpose of these ships was to defend their community, and they would temporarily be put to very effective use against the blockade surrounding Charleston. The CSS Chicora and

CSS Palmetto State, built by the Confederate government and the people of South Carolina respectively, would come to engage the Union naval blockade that strangled the South, often called the "Anaconda Plan." It is this confrontation by the two sides, more specifically the Confederate gunboats and the Union blockade, that would have wide ranging effects.

Poster Number 141: Adam Toering

"GIS Data Processing and Analysis of Archaeological Sites in Armenia"

In the broad mountainous expanse of the Armenian Highland (encompassing much of eastern Turkey, northern Iran, and the south Caucasus republics of Georgia, Armenia, Azerbaijan), the periods of the Late Bronze Age (LBA, c. 1500-800 BC) is associated with the construction of large hilltop stone fortifications. These monumental fortresses are among the earliest, and most conspicuous, signs of sociopolitical complexity in the region, and yet we still know remarkably little about how these settlements related to each other socially, politically, and economically. In this Wilke internship project, Adam Toering is using GIS software to analyze patterns of inter-visibility between forts as a means of identifying allied clusters of fortress communities on the landscape. Findings from this pilot study will provide important new data for addressing questions vital to Prof. Ian Lindsay's archaeological research, including: What were the relations between highland fortresses, and how were these polities defined spatially and institutionally? What effects do territorial claims and boundary behaviors have on the construction of networks, and how are social ties mobilized to establish territorial control? And how did the diverse economic, territorial, and political stakes of conflict in each period shape these communities?

Poster Number 142: Hannah Vaughn

"The Queen of Hearts: How Diana, Princess of Wales, Changed the Perception of the British Monarchy, 1981-2013"

My thesis will focus on the life and death of Diana, Princess of Wales and the affect that her fashion, image, and overall presentation had on British perceptions of the monarchy, between 1981 and 2013. Diana presented the British people

with a side of their monarchy that they had never witnessed before. Through her sense of fashion, personal interviews, and charitable work - Diana was president or patron for over 100 charities during her lifetime - she broke down the barrier between the private and public lives of the monarchy.   She disclosed her life to the British public, allowing them to feel connected with the royal family, and thus used this connection to gain their overall support. As such, by the time of her death in 1997, Diana received the highest approval rating out of the entire royal family in the United Kingdom, leading at her highest point, with a 90% approval. Diana herself stated, in the 1995 BBC Panorama Interview, "I remember when I used to sit on hospital beds and hold people's hands, people used to be sort of shocked because they said they'd never seen this before, and to me it was quite a normal thing to do. And when I saw the reassurance that an action like that gave, I did it everywhere, and will always do that."   Diana transformed herself into a person to whom the public could relate to; presenting herself with a common humanity. Thus, Diana's humanity made her accessible to the general public, and had an increasingly favorable effect on her soaring popularity.

Poster Number 145: Kate Yeater

"Thieves in the Rain Forest: The Status of Illegal Logging in Brazil and Indonesia"

My research focuses on illegal logging in Brazil and Indonesia. I compare the decrease of deforestation in Brazil to the continuation of deforestation in Indonesia to understand what forces are contributing to these trends. My research was for POL 223: Introduction to Environmental Policy - Honors, and I utilized three approaches to understand the state of illegal logging in both countries: interests, institutions, and ideas. I found that interests, that is, economic motivations, contribute to deforestation in both countries. In Brazil logging, mining, soybean farming, and cattle ranching are all driven by profits. In Indonesia, the agribusiness sector is again, a large perpetrator of rain forest destruction. After looking at the histories of deforestation in both areas I found that government regulation was the main difference in why Brazil has been able to (from 2004-2011) reduce deforestation while Indonesia has failed. By understanding the factors that have helped mitigate illegal logging in Brazil, I have

identified some future projections and suggestions for how Indonesia, Brazil, and other countries with rampant deforestation can attempt to mitigate illegal logging and reduce deforestation.

College of Science

Poster Number 147: Taylor Bailey

"Recombinant approach to control Listeria monocytogenes infection in pregnant guinea pigs"

Listeria monocytogenes (LM) is a Gram-positive bacterium, ubiquitous in nature and is associated with foodborne illness transmitted by produce and processed meat and dairy products. Incidence rates of listeriosis are relatively low, however, the morbidity of the disease is disproportionately high in pregnant women and their fetuses often manifesting as meningoencephalitis or spontaneous abortion. In this study, we tested the protective capacity against LM infection of a bioengineered Lactobacillus casei expressing the Listeria Adhesion Protein (LAP) using a pregnant guinea pig model. Animals were divided into experimental groups with differential probiotic application and pathogen challenge. Microbial loads, serology and histopathology were determined upon sacrifice in feces and organs/tissues. Although preliminary examination demonstrated limited clinical or pathological evidence of infection, microbiological analyses suggest colonization potential of the probiotic correlated with increased or decreased shedding of the pathogen. Further analysis is to include interrogation of gut microbiome perturbation by application of the probiotics. As our understanding of the importance of the interplay between commensal microflora and the GI tract grows, probiotics are increasingly becoming a more desirable therapeutic vector. Such targeted approaches may offer pathogen-specific protection while offering non-specific improvements to mucosal immunity.

Poster Number 148: Shovik Bandyopadhyay

"Combinatorial Inhibition of Cholesterol Esterfication and Bcr-Abl Synergistically Suppresses Proliferation of Chronic Myeloid Leukemia with Bcr-Abl Independent Imatinib Resistance"

Since the advent of tyrosine kinase inhibitors (TKIs) such as imatinib (IM), nilotinib, and dasatinib, chronic myeloid leukemia (CML) prognosis has improved greatly. However, 30-40% of patients resist imatinib therapy, and 40% of these patients display Bcr-Abl independent resistance. In these cases imatinib dose escalation is the commonly used treatment option, which is often ineffective. In our evaluation of CML cell lines through label-free Raman spectromicroscopy, we discovered an aberrant accumulation of cholesterol ester. Targeting cholesterol esterification with avasimibe, a potent inhibitor of acyl-CoA cholesterol acyltransferase 1 (ACAT-1), significantly suppressed CML cell proliferation and overcame imatinib resistance in Ba/F3 cells with the kinase domain T315I mutation and K-562-R cells with Bcr-Abl independent imatinib resistance. We also showed that altered cholesterol metabolism in CML is a cancer-specific target because normal cells do not accumulate cholesterol ester. Furthermore, we showed that combination of avasimibe and imatinib causes a profound synergistic inhibition of cell proliferation in K-562-R cells with Bcr-Abl independent resistance, but not in Ba/F3 T315I. Collectively, these data suggest a new avenue for overcoming Bcr-Abl independent TKI resistance in CML by targeting altered cholesterol metabolic pathways.

Poster Number 149: Dhruv Bole

"Conformational Changes of a Membrane Bound Protein--ABC Transporter"

The ATP-Binding Cassette, or ABC transporter, is a group of diverse membrane-bound proteins involved in numerous diseases including cystic fibrosis, cancer and multidrug resistant bacteria. Little is known about these proteins but the ribose transport complex in bacteria may serve as a model for how these transporters transport molecules too and from the cell. Knowledge of the conformational changes of these proteins may one day lead to an effective drug. The purpose of

this study is to determine how ATP hydrolysis morphs the protein complex from an 'unbound' to 'bound' state. To determine the configuration of the proteins, ribose transport complexes associated with sequential stages of the transport cycle were isolated in the presence of different substrates. By adding strategic cysteine mutations, these complexes were studied using Electron Paramagnetic Resonance (EPR) spectroscopy to observe how protein interaction affected their conformation. The results below show ribose interactions of the nucleotide-binding domain (NBD), RbsA, with different variations when Mg^{2+}, vanadate, and ATP are added. These results suggest that the complex 'opens' up when those three components are added together. Future experiments include how ribose interactions of TMD, RbsC, associate with ribose-binding protein RbsB, which in turn interact with nucleotide binding-domain RbsA. This clinically relevant complex could give us further insight to how these ABC transporters transport molecules to and from the cell.

Poster Number 150: Melissa Casella

"Src-mediated phosphorylation of Aplysia cortactin"

Cortactin is an actin-binding multi-domain protein and substrate for Src tyrosine kinase with functions in cell migration, endocytosis, and tumor cell metastasis. The role of Src-mediated tyrosine phosphorylation of cortactin is not well understood in several of these actin-dependent processes. Recent work from our laboratory revealed that both Src2 and phosphorylated cortactin are critical for controlling actin organization and dynamics in Aplysia neuronal growth cones; however, we do not have any direct biochemical evidence that Src2 phosphorylates cortactin in Aplysia. We used cortactin co-immunoprecipitation and immunoblotting to address this problem. Using protein lysates from Aplysia central nervous system tissue, we were unable to demonstrate an interaction between Src2 and cortactin thus far. Furthermore, immunoblotting with an anti-phosphotyrosine antibody did not reveal any phosphorylated cortactin. It is possible that the level of tyrosine phosphorylation is relatively low in adult Aplysia neurons and therefore difficult to detect with our method. We currently use heterologous expression of cortactin and constitutive active Src2 in CHO cells in

order to determine whether Src2 phosphorylates Aplysia cortactin. Future studies will identify which specific tyrosine is phosphorylated. This will enable us to design a phospho-cortactin-specific antibody, which will be an invaluable tool to investigate the function of cortactin phosphorylation in growth cone motility and guidance. /

Poster Number 152: Jessica Cleveland

"When the going gets tough do the tough get going?: Ramifications of drought on parasite populations."

Climate change has become the topic of major concern, especially as we work to predict its impact on humanity. There is evidence that climate change will result in increased prevalence of disease in humans. Host parasite interactions in unfavorable conditions have become a significant field of study with the rising concerns generated by global warming. Schistosoma mansoni is a parasite that causes schistosomiasis, a disease that impacts over 230 million people. The parasite has a complex life cycle that uses the aquatic snail Biomphalaria glabrata, from which the infective stage to humans is released. Drought, a condition that is disadvantageous for B. glabrata snails host of S. mansoni, is an environmental condition that is considered to be worsening as global warming progresses. The goal of this study is to determine the effects of drought on S. mansoni development and transmission. Previous studies to identify the effects of drought on the parasite have not yet been carried out. Six hundred seventy two B. glabrata snails were divided into 4 treatment groups: Control (uninfected, no drought), Stress-Control (uninfected, droughted), Infected-Control (infected, no drought), and Infected-Stress (infected, droughted). We measured parasite and host life history traits (time to infection patency, number of parasites shed, host growth, reproduction, and mortality) in hopes to shed light on how populations in high-risk areas may be affected by drought now and in the future.

Poster Number 153: Ehren Brant Coburn

"The Relations Between Stochastic Processes, the Temperley-Lieb Algebra and Quantum Spin Chains"

We examine a stochastic model known as the raise and peel model, which describes a surface growing by deposition of particles onto a surface. This includes a mechanism that peels portions of the surface by creating avalanches of desorbing particles. Stochastic models such as the raise and peel model can be written as a Markov process. The structure of the raise and peel model for one particular choice of parameters has been found to have an interesting connection to the Temperley-Lieb Algebra and XXZ quantum spin chains. The Temperley-Lieb Algebra is given by operators and relations which can be interpreted as the processes taking place in the raise and peel model. Therefore, the Hamiltonian for this system can be expressed in terms of the generators of the Temperly-Lieb Algebra which in turn have a representation as XXZ quantum spin chains. As an example, we show this explicitly for a spin chain of length L=2 and L=4. We conclude by describing our current investigation of the spectra of the cyclic representation of the periodic Temperley-Lieb Algebra in terms of combinations of XXZ quantum spin chains. The cyclic representation of the Temperley-Lieb Algebra can be described graphically by the wrapping of loops around a cylinder. Numerical studies have shown a complex Virasoro spectrum suggesting an underlying connection to a combination of XXZ spin chains that we plan to uncover.

Poster Number 154: Jenna DeSousa DeSousa

"Designing Testing Methodology for Developing a Bone Adhesive from a Biomimetic Polymer"

Injuries involving broken bones are currently repaired through an invasive technique involving the use of screws, plates and sutures as support which damage healthy bone and tissue. A surgical adhesive can provide a quick and easy alternative, which will minimize the risk of damaging healthy bone and tissue. A bone glue needs to be both high strength and wet setting in order to replace the

use of plates and screws. Inspiration for such materials can be found by looking at marine mussels as they are able to stick to nearly any surface, even in wet environments. Marine mussels affix themselves to different surfaces using adhesive plaques consisting of various proteins. An unusual amino acid in these proteins, 3,4-dihydroxyphenylalanine, is key to high strength adhesion. To mimic the mussel adhesive, poly[(3,4-dihydroxystyrene)-co-styrene] was developed. The high bond strength and wet setting properties of this glue make it a promising option as a bone adhesive. In order to maximize adhesion strength, methods for consistent substrate preparation, bonding, and testing have been developed. Initial testing shows that with the right combination of conditions, this biomimetic polymer is a promising solution as a bone adhesive.

Poster Number 156: William Downing

"A Reanalysis of the 1974 Super Outbreak"

The so-called Super Outbreak of April 1974 produced the second most tornadoes during a 24 hr period, making this event one of the most destructive in American history. This outbreak is also noted for the unusually large number of strong, violent tornadoes (F4 or greater). The purpose of this study was to perform a thorough examination of the mesoscale environment of this historical event in order to gain a deeper understanding of the conditions necessary to produce violent tornadoes on such a large scale. This was accomplished by simulating the event using the Weather Research and Forecasting (WRF) model using data from the 20th Century Reanalysis Project as initial conditions. / To ensure that the simulation accurately reproduced the large-scale environment of the outbreak, results were compared with surface observations collected from the National Climatic Data Center (NCDC) for a comparison with WRF model output. Upper-air observations were also collected for comparison to model results. . Preliminary findings demonstrate that the WRF simulation accurately reproduces many key aspects of the mesoscale environment. /

Poster Number 157: Stephenie Droll

"Molecular Mapping of a Gene for Resistance against a Fungal Pathogen in Wheat"

Genetic analysis and mapping of a gene for resistance to fungal disease Septoria tritici blotch in wheat, using molecular markers to refine a map location for the gene. Used disease inoculation, DNA extractions, and PCR followed by a computer analysis of the results.

Poster Number 158: Huan Fang

"Geographical analysis of the sources of NOx that affect Tucson, AZ"

The airborne pollutants such as nitrogen oxides (NOx) associated with urbanization have obvious effects on its downstream ecosystems. The high value of atmospheric deposition of NOx will potentially cause shifts in plant and microbial biodiversity, declines in sensitive organisms, soil acidification, eutrophication of coastal water and estuaries, and degradation of surface water and groundwater. The stable isotope of nitrate, $\delta15N$, is used to trace the relative importance of different NOx sources. The research area, Tucson, AZ, located in a semi-arid basin in the southwestern United States, is affected by emissions from the major nearby cities. The atmospheric deposition data of the year 2006 indicates the seasonal change of $\delta15N$, with significant increase during the winter season. With the constant local emission throughout the year, the possible reasons for this trend are the lower boundary layer height during winter, which prohibits the vertical mixing; and the more active frontal passages during the winter season, which transport the pollutants from major cities nearby. On this poster, the geographical analysis of how these sources of NOx affect the study area in different seasons is presented. The Hysplit atmospheric trajectory model, MetCor modeling software, and ArcGIS were used to assess if any particular geographical region contributed to high nitrate $\delta15N$ values observed n Tucson. The research concluded that no external NOx sources were likely important and that local NOx emitted with the Tucson region dictated the $\delta15N$ values.

Poster Number 159: Elizabeth Fernander

"Examining role of SOX9 in pancreatic cancer development"

Pancreatic ductal adenocarcinoma (PDAC) is among the leading causes for cancer related deaths in the US. Research is being conducted to gain a better understanding of the genetic and cellular changes that occur within pancreatic acinar cells, from which PDAC originates. Thus discovering new biomarkers and drug targets which can improve the early detection and treatment methods of this disease. The transcription factor SOX9 is believed to play a critical role in the development of PDAC. SOX9 is typically only expressed in ductal cells, and is absent in acinar cells. However, in both early initiating events in PDAC pathogenesis and in fully formed PDAC tumors, SOX9 expression is clearly detected in acinar cells. Recent studies involving SOX9 have shown that acinar-specific deletion of this transcription factor prevents the development of precancerous lesions, which eventually give rise to PDAC. Despite the significance of SOX9 in the development of PDAC, little is understood about its specific gene targets and the exact role it plays in producing cancerous phenotypes. Target sequences for SOX9 binding have been identified, and candidate gene targets within pancreatic acinar cells have been proposed by RNA-seq. To test the regulation of these targets, gene promoter luciferase assays will be completed and verified by chromatin immunoprecipitation analyses. pcDNA3 plasmids containing SOX9 and a truncated D206-SOX9, will be transfected into HeLa cells along with SOX9 control reporter plasmids. These plasmids have been fully sequenced and tested for functionality, and will serve as positive and negative controls for testing our candidate SOX9 gene targets. In addition to testing the binding and regulation of SOX9 target sequences, further studies involving SOX9 will focus on CRISPR-Cas9 dependent deletion of the gene in PDAC cell lines and looking for variations in gene expression and cell growth.

Poster Number 160: Rebekah Figueroa

"Characterization of Biomass-relevant Traits in the C4 Grass Species Setaria"

There is a growing need to more completely understand the genetic composition of the C4 grass species, the main crop grown as biomass feed stocks, in order to develop the most efficient means for biofuel production. The compact size, short life cycle, large seed production, and close genetic synteny with major bioenergy crops, such as maize, sorghum, switch grass, and Miscanthus make Setaria italica (foxtail millet) an ideal genetic model to investigate C4 bioenergy grasses. Gene discovery of important biomass relevant traits in Setaria italica are directly translatable to improving the use of energy feed stocks. Toward this goal, we are classifying into large, multi-gene families cell wall related genes in Setaria italica using rice, sorghum, Arabidopsis, barley, brachypodium, and maize as backbone sequences. In addition, 200 recombinant inbred lines of the parent plants Setaria italica with Setaria viridis were crossed and given to us in order to map relevant biomass traits using Quantitative Trait Locus (QTL) analysis. Pyrolysis molecular beam mass spectroscopy (PyMBMs) will be used to chart relative lignin abundances in this population. A saccharification assay will be performed in order to better understand the digestibility of the population. This investigation found that comparisons with the Phenylpropanoid, Csl, and CesA maize gene families show numerous orthologs with Setaria italica. Preliminary findings from this study show Setaria italica may be a valuable model for biomass relevant traits in C4 grasses.

Poster Number 161: Jianing Fu

"Structural virology-viral protein study"

(Since the project is not finished yet, this abstract is not completed. I will write a new abstract for presentation.) / Rubella, which is also known as German measles or three-day measles, is a disease caused by Rubella virus (RV). The RV replicase P90 protein plays an important role in viral infection and replication, but the underlying mechanisms of P90 is not known, as well as the protein structure. Here, the main focus is p90's protein structure. Molecular cloning and protein

purification will be done. Furthermore, we will focus on the crystallization on the purified protein.

Poster Number 162: Ryan Golkowski

"Exploring the Capable Energy Transitions of Lanthanide Terpyridine Complexes"

The McMillin group is investigating the photophysical behavior of lanthanide-ligand complexes. The bound ligands act as antenna chromophores that sensitize emission from the Laporte-forbidden f-f excited states of the central metal. These antenna chromophores may be tuned by changing the substituent group on the terpyridine ligand. The complexes that were used have the formula $Ln(X-T)(NO_3)_3$, where X-T denotes a tridentate, 4'-substituted 2,2':6,2"-terpyrdine ligand. With this design, it is possible to change the substituent X as well as the metal center. When the metal ion is La(III), Lu(III), or Gd(III), one can monitor the flow of energy amidst ligand-based orbitals. On the other hand, incorporating Eu(III) or Tb(III) introduces f-f states into the picture.   terpyridine ligands of interest are 4'-(pyrrolidin-1-yl)-2,2':6',2"-terpyridine (pyrr-T) , 4'-phenyl-2,2':6',2"-terpyridine (ph-T), 4'-chloro-2,2':6,2"-terpyridine due to the existence of novel, low-lying intraligand-charge-transfer (ILCT) and $\pi \Rightarrow \pi^*$ states. The presentation focuses on understanding the results of absorbance, emission, and emission lifetime studies.

Poster Number 163: Sarah Harris-Kober, Alyssa Fanara

"Levels of Cytochrome C Oxidase in the Inferior Colliculus of Young and Aged Animals"

Age related hearing loss occurs across species and involves changes in the ability to detect and properly process sounds, specifically high frequency sounds. It is known that changes in mitochondrial function and oxidative stress compromise cochlear function; however, it is unclear whether these changes occur in auditory brain regions, which could contribute to a loss of perception of high frequency sounds. We are examining the levels of Cytochrome C Oxidase (COX) in high and low frequency responsive regions of the inferior colliculi (IC) of young and aged

rats. Since aging and neurodegeneration impacts ATP synthesis in other brain regions, we hypothesize that there will be an age-related difference in the levels of COX and that high frequency regions are affected more than low frequency regions. Digital images of COX-stained ventral and dorsal IC tissue sections were analyzed using ImageJ software to examine difference in COX protein levels with relative optical density (ROD) measurements. We found no consistent statistically significant difference (p>0.05, two-tailed unpaired t-test) in COX concentrations between dorsal and ventral regions and across age groups. The average ROD values were 21.16 +/- 4.94 and 19.22 +/- 6.61 for dorsal and ventral respectively and 18.69 +/- 3.99 and 21.57 +/- 7.81 for the two different age groups. We are conducting further characterization to draw more definite conclusions as to the neurodegenerative aging effects on hearing. /

Poster Number 165: Adam Horin

"Interactions of 2-amino-1-methyl-6-phenylimidazo [4, 5-b] pyridine (PhIP) in the pathogenesis of Parkinson's Disease"

Parkinson's disease is the second most common neurodegenerative disease. It is characterized by the aggregation of the protein α-synuclein and formation of Lewy bodies, leading to the loss of dopaminergic neurons in the substantia nigra pars compacta and depletion of dopamine in the striatum of the brain. In this study we are looking at 2-Amino-1-methyl-6-phenylimidazo(4,5-b)pyridine (PhIP), a heterocyclic amine produced in a pyrolysis reaction from cooking meat at high temperatures, and its potential role as a neurotoxin involved in the pathogenesis of Parkinson's disease. Previous studies from our group using primary midbrain cultures have shown that PhIP causes dopaminergic cell death. In this study we use rat models to demonstrate a potential in vivo model of PD using PhIP. We analyzed the striatal terminal density in the brains of rats from acute and sub-acute studies. Based on previous evidence we are expecting to see a loss of dopaminergic neuron terminals in the treated animals. /

Poster Number 166: Elizabeth Claire Hosinski

"Changes in Visual Attention in Relation to Conspecifics in Starlings"

Animals focus on two activities: foraging and scanning for predators. There are two proposed mechanisms for temporally modifying patterns of foraging and scanning. One mechanism is temporal synchrony, whereby two individuals are more likely to be both scanning with their head up or both foraging with their head down more often than expected by chance. The second strategy is temporal coordination, whereby an individual is more likely to be scanning while their neighbor is foraging, and vice versa, more often than expected by chance. / In our study, we focused on the spatial patterns of scanning. Spatial scanning can also be either coordinated or synchronized between individuals. While both animals are scanning, they may spatially coordinate their scans by focusing their visual attention in different locations. Similarly, animals may spatially synchronize their scans by focusing their visual attention toward the same location. / We hypothesized that increasing spatial synchrony can compensate for temporal gaps in scanning associated with temporal synchrony. Since starlings tend to temporally synchronize their scanning patterns, we predicted that starlings would spatially coordinate their attention. Contrary to our predictions, starlings do not spatially coordinate their spatial attention. However, starlings are more likely to spatially change the location of their attention when their neighbor does sooner than is expected by chance. This result suggests that starlings may "mimic" the level of vigilance of their neighbor, which could serve as a mechanism to transmit information about perceived risk throughout a flock. /

Poster Number 167: Wan Jiang, Yao Tang

"The Impact of Patient Self-Management Interventions on Health and Healthcare Outcomes"

Nowadays, a significant amount of research articles documented health-related interventions with the aim of improving patient self-management of healthcare needs, especially in context of chronic diseases. The term of patient self-management, sometimes referred to as "patient empowerment", is often

operationalized as "self-efficacy" or "patient activation". It has been noticed that patient empowerment is associated with patient awareness of their own ability and motivation to effectively take care of their condition. Therefore, empowerment, in most cases, is considered as a factor between interventions and outcomes such as behavior change and healthcare costs, and is listed as a dependent variable to study self-management interventions. However, this is no obvious evident about what kinds of interventions can best improve patient empowerment. Under this circumstance, we are working on a large-scale meta-analysis of these types of interventions to identify factors associated with the effectiveness of such interventions across a variety of health issues and chronic conditions. Interventions to improve self-management vary widely in content (education programs, individualized counseling, etc.) and format (online, face-to-face, group, etc.), such that there is no clear consensus about what types of interventions best improve patient self-management with different chronic conditions. /

Poster Number 168: Austin Klasa

"Password Coping Mechanisms"

Passwords are the most common means of authenticating users, and the number of passwords a user must remember is increasing. This leads to the need to classify and study password coping mechanisms: any method used to cope with the large number of passwords a user must remember for multiple accounts. After a literature review and analysis of past research, a pattern of password coping mechanisms emerged. These findings present a map of past research and were utilized to classify password coping mechanisms and to create a password coping mechanism taxonomy.

Poster Number 169: Ashlynn Kokaska

"Assessing the role of Fic (filamentation induced by cAMP) proteins in E. coli"

Fic proteins are evolutionarily conserved from bacteria to humans, and are characterized by an Fic amino acid motif. Several bacterial Fic proteins act as virulence factors or toxins that post-translationally modify host proteins leading

to cell death, a mechanism pathogenic bacteria exploit to evade immune defenses. Fic proteins are inter- or intra-molecularly regulated and can be classified into three toxin/anti-toxin groups with the Therefore, Fic proteins have been classified as toxin/anti-toxin modules. Fic proteins were originally identified in Escherichia coli, where a mutation in the gene encoding the E. coli Fic protein (EcFic) resulted in aberrant cell division. Consequently, E. coli developed a filamentation phenotype in response to heat shock and cAMP, thus coining the name Fic (filamentation induced by cAMP). Despite the advances in understanding Fic proteins from pathogenic bacteria, there is a lack of a basic understanding pertaining to the role of Fic proteins during the life cycle of non-pathogenic bacteria such as E. coli. Our goal is to understand the role of EcFic in regulating cell division in E. coli and why its aberrant function causes filamentation. To this end, we aim to study the E. coli toxin/anti-toxin complex comprised of EcFic and its putative inhibitor, YhfG. By co-expressing affinity tagged versions of EcFic and YhfG, we aim to identify protein targets that the EcFic-YhfG complex interacts with. These protein targets will be identified by mass spectrometry, and then be validated and assessed for Fic-mediated modifications. having the characteristic motif of (S/T) XXXE (G/N) within the Fic protein or as a separate protein. Escherichia coli is a simple bacterium containing anti-toxin/toxin protein complexes. One understudied complex is the Fic/YhfG complex where Fic and YhfG are the predicted toxin/antitoxin complex, respectively. We predict some of these interacting proteins may be involved in cell division pathway.

Poster Number 170: Dayoon Kwon

"Imaging hydrogen peroxide in live Aplysia neuronal growth cones using biosensor"

Hydrogen peroxide (H_2O_2) is a reactive oxygen species (ROS) that has emerged as an important signaling molecule controlling a number of cellular processes including cell migration, differentiation, and apoptosis. We have recently shown that ROS are also critical for neurite outgrowth and actin dynamics in neuronal growth cones, which are highly motile structures at the tips of neurites. In order

to fully understand the role of ROS in growth cone motility, we need to be able to image and quantify specific ROS with high spatial and temporal resolution. To achieve this goal, we have cloned two different variants of the genetically encoded H2O2 biosensor HyPer into a vector suitable for expression in cultured Aplysia neurons. The HyPer2 cytosolic variant will allow us to monitor and quantify cytosolic H2O2, whereas the plasma membrane variant HyPer-PM detects H2O2 close to the cell membrane. Next, we will express these biosensors Aplysia neurons via microinjection of mRNA and validate them by ratiometric fluorescence imaging while manipulating H2O2 levels in growth cones. Quantifying temporal and local H2O2 changes in neuronal growth cones will be critical to gain a better understanding of how these highly reactive and diffusible signaling molecules control neuronal development and regeneration.

Poster Number 171: Vivien Lai

"Aberrant Migration of Neuroblasts in the Subventricular Zone Following Intranasal Manganese Exposure"

Exposure to manganese (Mn) causes clinical syndromes similar to Parkinson's disease. Our earlier studies show that Mn increases cell proliferation in the subventricular zone (SVZ) and migration towards the olfactory bulb (OB) along the rostral migratory stream (RMS). Cell migration following solvent exposure shows that these cells migrate to other areas of the brain rather than following the RMS to the OB. However, the question as to whether exposure to Mn caused aberrant migration remained unknown. This study was designed to test the hypothesis that intranasal (IN) exposure to Mn disrupted the migration of neural cells in RMS, which contributes to Mn-induced neurodegenerative injury. Rats received intranasal dose of Mn for 14 days. The low dose group received 0.2 mg Mn/kg while the high dose group received 0.8 mg Mn/kg and the control dose group received saline. During the last 4 days, animals received 100 mg BrdU/kg to trace the cell proliferation. Immunocytochemical studies were performed to co-localize BrdU and DCX, a marker of neuroblasts. Confocal quantification of regions of interest near the SVZ revealed significant differences in BrdU signals between low and high dose groups (437.4 ± 168.8SD and 914.1 ± 371.2, respectively; n= 3-8; p

< 0.05) and DCX (243.1 ± 89.7 and 463.2 ± 128.0, respectively; n= 3-8; p < 0.05) at 4X magnification. Additionally, quantification at 10X magnification indicates a significant lower BrdU expression in the low dose animals (256.5 ± 32.8) than that of controls (542.9 ± 235.6) (n= 4-6; p < 0.05) at the superior lateral aspect of the SVZ. Our work indicates that the low dose intranasal Mn exposure, compared to controls, greatly reduces migration of neuroblasts from the SVZ to OB. Continued Mn exposure appears to increases aberrant migration from SVZ into the corpus callosum. Whether intranasal Mn exposure affects cell proliferation, differentiation and/or migration deserves further investigation.

Poster Number 172: Qingling Li

"The difference between male and female directed songs in Brown-headed cowbirds"

Brown-headed cowbirds (Molothrus ater) are a good example of a songbird that evolved songs via inter- and intra-sexual selection; indeed, song can signal multiple pieces of information, including courtship and aggressive intentions. A previous study assumed that there is no difference between female and male directed songs within this species. However, Morton's Motivational Structural Rules hypothesis suggest that physical structure of sound has a relationship with the motivation underlying its use. Therefore, we predicted male cowbirds will sing higher frequency and more tonal sounds when directed towards a female, but lower frequency and wider bandwidth when directed to a male. Using a cross-correlation analysis, we found that pairs of songs are more dissimilar if they are directed to different sexes compared to songs directed to the same sex. Using Sound Analysis Pro, we found that these differences are caused in part by significant differences in fundamental frequency and entropy in male versus female songs and that our results supported the Motivational Structural Rules hypothesis. These findings suggest that in highly social species, male birds may modify their songs to direct their signals to a specific receiver.

Poster Number 173: Chen Lin

"ab Initio Study of Hydrogen Migration across 3-hydroxy-2-propenal"

The hydrogen migration within 3-hydroxy-2-propenal and radicals on each carbon are investigated by high level ab initio calculations. The aim of this project is to determine reaction enthalpies, and activation energies of the hydrogen migration across the molecule (S1), central carbon radical (S2), hydroxyl side radical (S3) and carbonyl radical (S4). All calculations during this investigation are performed using Gaussian 09 programs. The calculations for all reactants, products and transition state species are carried out using Brueckner Double. The calculation shows that as the symmetric structure S1 and S2, the electronic clouds are well delocalized within two carbons and hydroxyl hydrogen migrated between two oxygen atoms during its transition state. As the asymmetric structure S3 and S4, the hydroxyl hydrogen always migrates to carbonyl, transferred as S3 structure. We investigate this special occasion by curing the potential energy of S3 to S4 with fixed O-H distance. The curve derived indicate the lower energy of S3 is.

Poster Number 174: Donald Little, Samuel Schafer

"HIV Chromatin is a Preferred Target for Drugs that Bind in the Minor Groove"

The genome of human immunodeficiency virus type 1 (HIV-1) displays an unusual single-stranded bias being rich in A but not U and deficient in C but not G. This genomic bias controls HIV phenotype by dictating the unusual composition of essentially all HIV proteins. Since drugs that bind in the DNA minor groove disrupt nucleosomes on sequences that contain closely-spaced oligo-A tracts, which are prevalent in HIV, it was of interest to determine if these drugs exert this selective inhibitory effect on HIV chromatin. Previous results have shown that minor groove binding drugs (MGBDs) inhibit the assembly of nucleosomes onto five HIV-1 genome segments in a manner proportional to the A-bias. In order to test the effects of MGBDs on previously assemble chromatin, HIV-1 pol DNA was reconstituted onto nucleosomes at physiological salt concentration, which were then subjected to drug treatment. DAPI, a stronger drug, and berenil, which is currently used in the clinic to treat various infections and sleeping sickness, were

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applied to separate samples of nucleosomes. These samples were then digested, and mononucleosomal DNA was recovered. High-throughput sequencing will be utilized to compare reads of treated and untreated nucleosomal DNA to determine an observable nucleosome shift in the presence of MGBDs. Results may provide insight into selectively targeting the A-bias of lentiviruses with MGBDs in the HIV-1 phenotype.

Poster Number 175: Linjia Liu

"Mechanistic Insight into Receptor Specific Gene Delivery by Cationic-β-Cyclodextrin:Hyaluronic Acid- Adamantane Host:Guest pDNA Nanoparticles"

Targeted delivery is a key element for improving the efficiency and safety of non-viral vectors for gene therapy. We have recently developed a CD44 receptor targeted, hyaluronic acid-based pendant polymer system (HA-Ad), capable of forming complexes with cationic β-cyclodextrins (CD+) and pDNA. Complexes formed using these compounds (HA-Ad:CD+:pDNA) have shown high water solubility, promising transfection efficiency and cell viability. Herein, we have also studied their target specificity, the detailed mechanistic aspects of the transfection process, such as cellular localization, interaction with endosomes/lysosomes and escape, and intracellular transfection. Confocal microscopy and multicolor flow-cytometry techniques were used for the spatial and dynamic tracking of transfection complexes in vitro. We have demonstrated the CD44 receptor specific enhanced cellular uptake and transfection efficiency of HA-Ad:CD+:pDNA complexes.

Poster Number 176: Weichuan Luo, Tiange Dong, Tianzhao Wu, Tianmu Hu, Ruifeng Ji, Andrew Walden, Eric Petit, Hyun Dong Lee

"Analyzing biology research trend through research articles of biology databases"

There are many biological databases constructed every year. At the beginning of every year, the scientific research journal Nucleic Acid Research (NAR) publishes a database issue containing over 100 papers on newly released databases and updates to existing databases. Since the content of the database issue reflects the

topics of focus in biological research at the time of publication, we hypothesized that analyzing the databases included in the yearly NAR database issue can highlight and capture the change of research trend over the years. To begin with, we have manually analyzed 185 database papers in NAR Volume 42 Issue D1 published on January 1, 2014. Information such as the kind of data archived, keywords, classification, whether or not the website is functional, and the last update date of each database are included in our research. Based on the information gathered from the databases listed and generalize the types of data being researched and inquired about. This process provides classifications that serve our purpose more effectively than those provided by the database issue. For the automatically analysis, we have created a basic program in Python to capture keywords based on the frequency appearing in an article and assign the paper to the group featured for the similar keywords. As a future work, we are going to generate a program able to study from the basic computational outputs and the manual results on the 2014 issue D1, and deduce an optimum literature algorithm which can be applied to the NAR issues from previous years to identify trends in biological research. /

Poster Number 177: Sarah Mace

"Does Genetics Affect the Response of Lumbar Spine to Dietary Calcium Restriction?"

Serum calcium (Ca) levels are tightly regulated by a three tissue axis of intestine, kidney, and bone. The actions of these organs serve to maintain whole-body Ca homeostasis by increasing intestinal Ca absorption efficiency, renal reabsorption, and bone resorption when dietary Ca intake is low. The purpose of this study was to determine the role of genetics in the lumbar spine response to dietary Ca restriction. We studied the spines of male mice from 51 BXD recombinant inbred lines and fed them either a basal Ca diet (0.5%) or a low Ca diet (0.25%) from 4 to 12 weeks of age. Using medium resolution micro-CT, we analyzed the trabecular bone parameters: bone volume fraction (BV/TV), trabecular number (Tb.N), trabecular thickness (Tb.Th), and trabecular separation (Tb.Sp). After correcting for confounding effects of body size, we conducted ANOVA to determine

significant main effects (line/diet) and line-by-diet interactions, and heritability estimates. We performed analysis for each phenotype, for each diet, and for our calculated parameter reflecting the response to Ca restriction (RCR). For each phenotype, narrow sense heritability estimates (h2) ranged from 0.60-0.35 in the basal and low Ca diets. This indicates that there remains a percentage of the phenotypic variation that is not explained by genetics. On the other hand, the RCR h2 were modest and ranged from 0.22-0.32. All parameters showed significant genotype and diet main effects (p<0.001), however, only Tb.Sp. showed a significant gene-by-diet interaction (p=0.013). Interestingly, for every parameter, the RCR was significantly affected by line (p<0.01), indicating that the genetic makeup affects the variation in the bone responses to Ca restriction. Our data reveal the existence of gene-by-diet interaction affecting lumbar spine, and this work provides a framework for further characterization of the genes influencing the responses of bone under controlled dietary conditions.

Poster Number 178: Amanda Mark, Faith Gooding

"Dendritic Complexity of Golgi-Stained Neurons in the Inferior Colliculus of Young and Aged Rats"

Presybycusis, or age-related hearing loss, is associated with the loss of ability to process high frequency sounds. It is a product of physical and chemical changes within the inner ear and in the neurons of the ascending auditory pathway. Neuronal dendrites have been shown to undergo a reduction in complexity with age, which will have an impact on neuronal function. However, whether this occurs within the ascending auditory pathway is unknown. We used 3-D anatomical reconstruction and complexity measurements to test the hypothesis that a reduction in neuronal complexity occurs with age in the inferior colliculus, an auditory nuclei. Analysis of the 3-D reconstructed Golgi- stained neurons focused on the changes in dendritic structure and showed that there was no difference in number of primary dendrites and no difference in the number of branching tips with age. The preliminary data suggest that age is not a factor in correlation to the number of dendrites and branching tips. We plan to continue collecting and analyzing data to see if our results change, due to an increased

sample size, and to investigate possible correlations of neuronal structure with measures of hearing function.

Poster Number 179: Connor Moore

"Phenacite; The Magic in Science
. Uses in Physics and Metaphysics"

Phenacite (also known as Phenakite) is a beryllium silicate (Be_2SiO_4). Phenacite is found in high-temperature pegmatite veins and in mica-schist located in Asia, Europe, and the Americas. The phenacite used for this experiment was found in Brazil. Phenacite has a curious reputation as a metaphysical substance. According to popular opinion, the mineral enjoys a reputation as the highest "energy" crystal and is used to stimulate the seven centers of spiritual powers in the human body. By contrast, when employed for scientific experimentation, phenacite is extremely useful as a source of pure beryllium. The pure beryllium is used by scientists around the world who employ cosmogenic nuclide dating in the fields of geology and geophysics, astrophysics, and environmental science. Our phenacite crystals contain trace elements of calcium, potassium, iron, and aluminum and requires physical and chemical processing to remove these impurities. Our poster details the process from phenacite crystal to pure beryllium. /

Poster Number 180: Ishra Noor

"Evacuation Behavior of 2011 Earthquake and Tsunami Survivors"

After the March 11th, 2011 Tōhoku Earthquake and Tsunami, parts of the coast of Japan near the small town of Watari suffered. At Magnitude 9.0, this earthquake remains the largest recorded earthquake to have ever hit Japan, a horrific surprise to the unprepared residents. Despite various warnings, the residents Watari responded in ways that often strayed from official expectations. Some remained behind; others were rescued or they fled based on a variety of variables. Since the 2011 disaster, Watari town officials revamped their emergency plan in the case of another large tsunami. The purpose of this study is to identify the most influential variables, and to see if the town's new evacuation plan addresses them. Given

Japan's location in the infamously active Pacific Ring of Fire and the potential effects of global climate change, these hazardous events may intensify. Thus, It is crucial to understanding evacuation behavior in order to implement effective safety procedures in the future. After gathering information from personal interviews conducted from some 60 Watari survivors, extracting GPS coordinates from their individual evacuation route maps, observing post-event soil moisture via Google Earth Historical Imagery, and locating the tsunami's inundation extent via Harvard's Interactive JapanMap, the initial results of our analysis indicate that distance from the coast did not play as large role in the immediacy of evacuation as other factors. Through further data analysis I seek to gain a better understanding of the evacuation patterns during the tsunami.

Poster Number 181: Ilyas Orazbek

""Big Data" in GIS: Evaluation of Data Handling libraries."

In the age of "BIg Data", Geographic Information Systems (GIS) are consuming ever-larger data sets. A current GIS project uses several data sets simultaneously which each comprise 17 billion points. Commercial software (ArcGIS) is overwhelmed by this and new approaches are needed. Both disk access and computational processes are excruciatingly slow. For this poster, Python libraries and some inventive approaches are investigated. The new tool is designed to access the new gSSURGO soil database to create raster layers from 31 million tabular attributes .

Poster Number 182: McKeith Pearson

"The Endocytic Proteins, Epsin and Sla2 cooperate for the regulation of cell division in Saccharomyces Cerevisiae"

Huntington's disease is one of the several neurodegenerative disorders caused by expansion of the number of glutamines (Q) present in the protein huntingtin. Research has extensively focused on the toxic gain-of-function phenotypes acquired by the Q-expanded huntingtin. However, loss-of-function effects (inability to fulfill biological functions) that also result from Q expansion lead to neurodegeneration. The purpose of this project is to address the question of how

the polyQ in huntingtin function to mediate protein-protein interactions. Although yeast does not have a huntingtin homolog, Q-rich regions are present in the endocytic protein epsin and the Ent2 paralog is crucial for the regulation of cell division. Importantly, the yeast homolog of the huntingtin binding partner HIP1 (Huntingtin Interacting Protein 1), known as Sla2, binds epsin. This further supports the idea that epsin's Q-rich regions may functionally replace huntingtin Q stretches in yeast. Using microscopy and extensive image analysis, here we show that Ent2 dominant negative (E2DN) constructs (lacking C-terminal determinants) induce cell division defects in a Sla2-dependent manner. Conversely, truncations of the C-terminus of Sla2 suppress the E2DN-dependent phenotype. Further, our data suggest that Q-rich regions of Ent2 and the second coiled coil domain (CC2) of Sla2 is necessary for this regulation of cell division. To summarize, we have discovered the first physiological function of Q regions in endocytic proteins. We believe that this research will provide important insights into the function of Q that are disrupted upon expansion.

Poster Number 183: Matthew Prather

"Fundamentals of LaTeX Typesetting With R- and SAS-Generated Statistical Graphics"

Knowledge of LaTeX, the universal, standard program for scientific typesetting, and of R and SAS, software ubiquitous in statistical analysis and data science, is undoubtedly valuable to students in mathematics, statistics, and actuarial science, who in required courses must often use one or more of these tools. But acquiring reasonably comprehensive and lasting proficiency in complex software is difficult, especially for the casual user. Despite the utility in being able to produce - faster than by alternative means and typeset to the highest standard - all types of coursework (assignments, projects, labs, notes, study guides), as well as presentations and documents for internship or job contexts, into which program code, tables, graphics, and other data may easily be incorporated, the LaTeX learning curve is steep and the documentation daunting. Moreover, there doesn't appear to exist a resource describing how to use LaTeX in conjunction with either R or SAS, even while their graphics output is very often destined for a LaTeX

document. / / These observations gave rise to the endeavor of creating a printed, handbook-style guide, which satisfies the following goals: / / 1) Provide a comprehensive, example-based reference for how to typeset in LaTeX the variety of documents that students in mathematics, statistics, and actuarial science routinely write, and for how to create elementary statistical graphics of high technical and aesthetic quality, optimized for inclusion in LaTeX documents, using both R and SAS; / / 2) Ensure deep enough treatment of fundamental software capabilities where necessary in order that the "look and feel" of documents and graphics may be determined according to the user's needs, judgment, and taste, rather than constrained by a more ad hoc approach; and / / 3) Include an abundant selection of topics and examples which promote and embody principles of good writing, graphic and information design, and mathematical notation.

Poster Number 184: Bryan Rainey

"PageRank Computation on a Raspberry Pi"

Google's PageRank algorithm evaluates the importance of webpages based on the links between them. More generally, the PageRank vector of an arbitrary graph measures the importance of each node in the graph. Using the common power iteration method, we implement PageRank on a Raspberry Pi, a $35 computer the size of a credit card. Additionally, we utilize sequential updating, a refinement of the power iteration method, to reduce the number of iterations required to compute the PageRank vector. We empirically analyze the performance of our implementation on graphs of networks with millions of nodes, including a 2010 crawl of Twitter with over 41 million nodes. Prior work on PageRank computation has used computer clusters with hundreds of cores. We demonstrate that a low-power computer such as the Raspberry Pi can compute the PageRank vector for these graphs in a matter of hours. As people continue to apply PageRank to problems in fields ranging from physics to neuroscience, we suggest that efficient PageRank computation does not always require sophisticated systems or hardware.

Poster Number 185: Shreeya Raman

"Affects of Diet on BDNF Levels in Mice"

The purpose of the project is to see the affect that different diets have on brain-derived neurotrophic factor (BDNF) levels in mice. Low levels of BDNF have been linked to obesity in rodents and in humans, therefore seeing how diets affect the levels of BDNF may shed light whether diet affects obesity. This research can give us an idea of how diets might affect obesity and food intake in humans. The different diets included in this project are high-fat/high-sugar diet, fasting diet, and a control diet. It is expected that a high-fat diet and fasting will decrease BDNF levels in the brain compared to the control. The seventeen mice were all fed the control diet until the experimental period, when they were split into three groups and given different diets. Seven mice were fed the high-fat diet, five were fed the fasting diet, and the remaining five were fed the control diet. All mice had no statistically significant difference in body weights and food intake prior to the experimental period. After the experimental period, the mice brains were harvested and protein levels in the brain were found using western blots. Samples were taken from the hypothalamus, the cortex, the hippocampus, and the dorsal vagal complex. The protein samples from the mice were loaded on an SDS-PAGE gel, run, then transferred onto a membrane, which was blotted using primary and secondary antibodies. They were blotted for BDNF, then stripped and re-blotted for actin, which acted as the control.

Poster Number 186: Meng She

"Effects of extrinsic triiodothyronine on visual behavior of wildtype zebrafish"

Thyroid hormone (TH) plays an important role in regulating the development of retina. Many studies done in vertebrates have shown that the regulation includes the control of gene expression in one of the photoreceptors--cones in retina. However, it has not been examined if the effects of TH on genetic level can influence visual behaviors. Our study was performed to determine if extrinsic TH exerts effects on visual behavior of wildtype zebrafish during early development. We focused on triiodothyronine (T3), one of the main forms of TH in vertebrates.

Both time range and concentration of T3 treatment were manipulated. T3 was applied either 1-3 days post fertilization (dpf) or 3-5 dpf, and each treatment time interval was with both 10nM and 50nM. Visual behavior of the larvae was quantified by measuring the optokinetic response (OKR) and the visual motor response (VMR) at 5 dpf. The OKR is the eye movement generated by the larvae due to the moving image of the surroundings to help stabilize the image on the retina and therefore generate a high-resolution vision. The VMR is the spike of motor activity in response of sudden light-on or light-off stimuli. We found that at lower concentration, 10nM, of T3, neither OKR nor VMR of the 2 treatment time intervals showed significant difference from the control group. However, with 50nM of T3, the OKR of both time intervals, and the VMR of 3-5 dpf treatment were significantly lower than control group. Our study indicates that 50nM of TH treatment from 3 to 5 dpf can affect visual behavior of wildtype zebrafish during the early development. Similar effects may exist in humans because of high level of conservation of retinal organization and developmental mechanisms among vertebrates. Thus, it may be helpful to look for treatments for visual malfunction in human by manipulating parts of the thyroid hormone pathway.

Poster Number 187: Xingyu Shen

"Using transitional metal to make beta haloketone"

Beta haloketone is a common motif which exists in a broad range of bioactive molecules and important synthetic intermediates. Synthetic methodology for synthesis of beta-carbonyl compounds usually involved the conjugate addition of alpha, beta unsaturated ketone via Michael addition. Herein, we reported a novel method to synthesis the beta-bromoketones through the transitional metal catalyzed cyclopropanol ring-opening reaction.

Poster Number 189: Selena Staun

"Oxidative Addition at Uranium with a 'Redox-Innocent' triamine ligand"

Unlike many transition metals, uranium is generally unable to perform two-electron processes such as oxidative addition and reductive elimination because of its low redox potentials. One way to overcome this barrier is by storing electron

density in a Redox-Active ligand to assist in oxidative addition. Recently, the pyridine(diimine) (PDI) ligand was shown by our lab to promote two-electron oxidative addition at uranium. The goal of this research is to replace the 'Redox-Active' pyridine(diimine) with a 'Redox-Innocent' triamine (RITA) ligand. The hypothesis behind this research is that oxidative addition will either a) not proceed; or b) proceed with electrons from the metal center. Current studies are focused on the preparation of a uranium(IV) complex bearing a RITA ligand. Additionally, a variety of oxidative addition test substrates have been prepared.

Poster Number 190: Jonathan Stelzleni

"Cosmic Ray Activity Due to Solar Maximum"

Cosmic rays are immensely high-energy radiation, originating inside and outside the Solar System. They may produce showers of secondary particles that penetrate and impact the Earth's atmosphere and sometimes even reach the surface. They are composed primarily of high-energy protons and atomic nuclei. When cosmic rays enter the Earth's atmosphere they collide with molecules, mainly oxygen and nitrogen. The interaction produces a cascade of lighter particles including x-rays, muons, protons, alpha particles, pions, electrons, and neutrons. This experiment focuses on detecting charged particles like muons and electrons using scintillation detectors and checking to see if cosmic ray events coincide with solar activity. A triple coincidence in multiple detectors at the same time is used in order to demand a minimum shower energy, which is set by the separation distance of the counter. The triple coincidence is also an indication that all of the particles came from one event in the upper atmosphere.

Poster Number 191: Hannah Stewart

"Symbiotic Effects on Caste Differentiation in Reticulitermes flavipes"

The eastern subterranean termite, Reticulitermes flavipes, is important for various reasons, ranging from pest control, to creating alternative fuel sources. R. flavipes has different castes that include workers, soldiers and reproductive, and also hosts protist and bacterial symbionts in its gut. If a worker termite is treated with Juvenile Hormone (JH), it will be induced to transition to an intermediate

pre-solider stage, with differentiation usually occurring 10-14 days after treatment. It is known that when a worker differentiates into a pre-solider, its gut protist count decreases dramatically. However, how symbionts might affect the differentiation process is not known. My hypothesis was that JH-treated worker termites with their symbionts removed would differentiate sooner than those with their symbionts intact. To test this, four treatments were performed on termites: untreated control, antibiotic control, JH control, and an antibiotic and JH treatment. Termites were then counted for survivorship over time, and the days at which pre-soldier differentiation occurred. There was no differentiation in the untreated control or the antibiotic control. There was differentiation in the JH control and the JH and antibiotic treatment, but my hypothesis was refuted as termites differentiated around the same time. However, most termites did not survive the differentiating process in the antibiotic and JH combined treatment, whereas in the other treatments mortality was less than 10-20%. These results suggest that protists do play a role in caste differentiation, possibly by buffering deleterious impacts of excess JH.

Poster Number 192: Devang Thanki

"TPD521L1 expression during development and time point-specific alterations of an atrazine exposure with the zebrafish model"

Atrazine is a commonly used herbicide in the Midwestern United States; its purpose is to prevent broadleaf and grassy weeds in crops such as corn. Currently, Indiana uses about 26 percent of its land to grow corn, and atrazine is used in ample amounts, resulting in runoff that leads to contamination of drinking water. The Environmental Protection Agency (EPA) has set the Maximum Contaminant Level (MCL) at 3 parts per billion (ppb) in drinking water but the herbicide is often found at higher levels. However, data suggests that atrazine can be harmful even at 3ppb. Previous studies from our laboratory have shown atrazine alters gene expression associated with neuroendocrine and reproductive system function, carcinogenesis, and cell cycle regulation following developmental atrazine exposure at 0.3, 3, or 30 ppb. From these studies, it was shown that at 72 hours post fertilization (hpf), atrazine elicits alterations of the gene, tumor protein D52

(TPD52L1) in the zebrafish. Previous studies have identified TPD52L1 in cell proliferation and calcium signaling, along with regulating expression at the G2-M transition in breast cancer cells. The goal of this project was to characterize the expression of TPD52L1 during development of the zebrafish, as well as determine genetic alterations caused by developmental atrazine exposure. To characterize the expression of TPD52L1 throughout embryogenesis, zebrafish embryos were bred and embryos were collected at 24, 36, 48, 60, and 72 hpf. In addition, alteration in TDP52L1 gene expression following atrazine exposure was assessed at the same developmental time points. Analysis showed consistent levels of gene expression throughout embryonic development (p=0.0714). Atrazine exposure showed a significant increase at 36 hpf in the 0.3 and 3 ppb treatments (p=0.0253), but no changes at 24 (p=0.2360) or 48 hpf (p=0.3040). Analysis is currently being completed for 60 and 72 hpf to determine developmental windows of sensitivity.

Poster Number 193: Bruce Tharp

"Nitrogen Stable Isotope (δ15N) Composition of Fossil Fuel Combustion Sources"

The nitrogen stable isotope ratio of NOx (δ15N-NOx) has been suggested as a regional indictor for NOx source partitioning; however, there is large uncertainty in the δ15N values for fossil-fuel combustion sources other than vehicles. This study aims to provide a detailed analysis of several NOx producing machines and their δ15N-NOx ratios. To accomplish this, several fossil-fuel combustion sources were sampled and analyzed for their δ15N-NOx ratio that included lawn and utility equipment, tractors, buses, and airplanes. A modification of a NOx collection method used by the United States Environmental Protection Agency was used to determine δ15N-NOx. A relatively large range of δ15N-NOx values were measured from -20.89 to -1.67‰ with cold started diesel-electric buses contributing on average the lowest δ15N values at -20.89‰, and warm-started diesel-electric buses contributing on average the highest values of -1.67‰. It was found that there is a negative correlation between NOx concentrations and δ15N-NOx values though the linear regression varies between NOx sources. This

suggests that the catalytic reduction of NOx may have an influence on δ15N-NOx values. Since fossil-fuel combustion represents a significant portion of all emitted NOx, this data will be helpful for others attempting to model the regional δ15N-NOx.

Poster Number 194: Jessica Uhler

"Transposable Element Dynamics of Schistosoma mansoni Inter-Strain Crosses"

Schistosoma mansoni is a trematode parasite that causes schistosomiasis, a neglected tropical disease affecting over 200 million people worldwide. The genome of S. mansoni consists largely of transposable elements (TEs), mobile DNA sequences with the inherent ability to proliferate and move to new loci in the genome. Proliferation of TEs can be induced under times of genomic stress, like hybridization events, due to breakdown of the normal TE repression systems. Such proliferations could provide adaptive advantages to the genome by innovating changing gene expression patterns. The aim of this project was to investigate this TE proliferation in S. mansoni by creating inter-strain crosses. We hypothesized that as compared to the parental strains, these inter-strain crosses would show an increased TE copy number. This could result in increased virulence on the intermediate snail host, resulting in slower snail growth rate, slower snail egg production, and increased cercariae production.   We quantified TE copy numbers in the schistosome genome using a SYBR Green qPCR assay. When we used two Schistosome strains originating from Puerto Rico, the parasite strain was not a significant factor in the virulence of the parasite, not supporting the hypothesis. However, the snail strain was a significant factor in both snail growth and production of cercariae. The parental parasites had significantly more TEs present than the cross strains in two of the genes tested, also not supporting the hypothesis. Further research was done using parasite strains from different geographical origins.

Poster Number 195: Aditya Vaidyam

"Distributed Cluster Computing in Computational Proteomics"

As computational algorithms become more and more prevalent in proteomics, and processing power becomes more readily accessible, efficiency and high scalability of algorithms becomes a force to consider optimizing. An algorithm must be concurrent and able to execute in parallel, and where concurrency can be difficult to implement within the algorithm itself, distributed and parallel systems can deliver a higher performance throughput without modifying the algorithm at all. On a heterogeneous computing platform, distribution of computational workload - the algorithm - can be modeled as actors. Originally designed for artificial intelligence in parallel and distributed systems, the actor model is capable at designing highly resilient, fault tolerant distributed systems. Two such computational proteomic algorithms are PFP, a sequence similarity-based protein function prediction algorithm that predicts GO annotations for an input sequence, providing far more information than can be found in a conventional database like BLAST, and ESG, a sequence similarity-based protein function prediction algorithm, that employs PSI-BLAST iteratively and selects consistent GO annotations. By applying this framework to PFP and ESG, given N nodes in a heterogeneous cluster, we achieve N-fold or more computational performance, and without modifying the original source. With a minimal overhead, simply deploy PFP and/or ESG, and an elastic scheduler will orchestrate the nodes.

Poster Number 196: Alexander Wade, Sam Higginbotham

"Wire Bond Encapsulation for the CMS Forward Pixel Upgrade"

The Phase 1 upgrade of the pixel tracker for the CMS / experiment will require the assembly of approximately 1000 modules consisting of / pixel sensors bump bonded to readout chips. Electrical connections between the / custom readout chips and support ASIC's that constitute the front-end of the pixel / data acquisition system are made via wire bonds to a thin printed circuit board. / Part of the assembly process carried out at Purdue University includes the partial /

encapsulation of the wire bonds for mechanical protection, prevention of electrolytic / corrosion, and to damp oscillations due to Lorentz forces from transient current / pulses in large magnetic elds. We present the details of the robotic assembly / process which allows the deposition of the viscous encapsulant compound with 100 / micron precision.

Poster Number 197: Xinran Wei

"Identification of Biased Language in Native Advertising"

Advertising is the business model for many services offering online content. Traditionally, the distinction between editorial content and ads was clear, however this distinction is becoming increasingly blurred. Native advertising, similar in concept to a traditional advertorial, is a form of paid media placement designed to resemble an article in form and function. From the readers' perceptive, it's not favorable to get fooled into believing they are reading a real article. From an Artificial Intelligence perspective, we want to see if a machine can tell the difference between these articles. So, we began to use machine learning techniques to achieve this. / / Since this is a machine learning task, a classifier is the first thing to implement. Support Vector Machine is a learning algorithm where we can input datasets of articles tagged as native-ad or editorial content, and train a model to automatically classify new (previously unseen) articles, as native advertisements or editorial articles. / / To collect enough data to train the model, I ran a web crawler and crawled 300 native ads and 300 unsponsored editorial articles from online media such as Forbes, The Atlantic and Wall Street Journal. Then I used Stanford CoreNLP library to tokenize the text and generate datasets, and ran SVMlight to perform training and testing. / / Our initial results are encouraging, however there are false positive decisions made by the classifier (i.e., it sometimes identifies editorial articles as native ads). In order to improve it, we still have to crawl more articles of less difference in length, and perform a deeper analysis on editorial articles.

Poster Number 198: Darcy White, Jake Ramsey

"Neuropharmacology"

The purpose of this project is to use a screening assay to discover whether or not roughly 300 synthesized compounds inhibit the activity of type V adenylyl cyclase in the cell. Though this experiment is still in its preliminary stages, the main experiment will involve quantifying the amount of cAMP in cells activated with forskalin and saturated with synthetic compound. There is no way to determine at this point exactly which compounds will inhibit the activity of the adenylyl cyclase.

Poster Number 199: Maggie Wigren

"Food Availability and Spore Production in Daphnia-Metschnikowia Interactions"

It is widely known that parasites can severely harm a host population, and identifying the factors that can enhance or inhibit diseases is crucial for the survival of the host species. Metschnikowia bicuspidata is a species of yeast that commonly infects the water flea Daphnia dentifera, and is extremely lethal to them. The disease can alter many factors in the ecology of Daphnia, such as susceptibility to predation or environmental stressors. Also, the environment can potentially alter Daphnia-Metschnikowia interactions. The main goal of this study is to determine how food availability for the host influences spore production of the pathogen. In this study, we exposed young Daphnia (neonates) to Metschnikowia and gave them various feeding treatments with increasing amounts of algal cells per milliliter of water. We monitored mortality throughout the duration of the experiment, as well as body size and spore production at the end. We predicted that a lower amount of food that is available to the Daphnia would decrease its immune function, which would make it more susceptible to disease. A higher amount of food available to them would increase immune function, while at the same time providing excellent resources for the Metschnikowia to grow inside of the Daphnia. Further implications of this study could reveal more information about food limitations in Daphnia-Metschnikowia

interactions, and could help predict when outbreaks of the disease may occur and the various ecological repercussions, and new methods for disease management.

Poster Number 200: ChanMi Youn

"Selective Stabilization of a Partially Unfolded Protein with the vary of Nucleotide"

Escherichia coil glyceraldehyde-3-phosphate dehydrogenase (GAPDH) is known as not binding with ATP in the native condition. In previous lab study, GAPDH has recovered to destabilize in the presence of ATP. Also, it recovered that equilibrium unfolding protein in urea showed that partially unfolded equilibrium intermediate when ATP present, and ATP accelerates the unfolding rate of GAPDH. These result analyzed by thermodynamics and kinetics of folding and unfolding of GAPDH in the presence of ATP. With that, we were curious whether other type of nucleotide also works similar as ATP with GAPDH or not. With the same technique, this experiment ran with different types of ligand as AMP, dAMP, GMP, and ADP with the same concentration to compare.

Poster Number 201: Ruiyu Zeng

"Experience-dependent mate choice in female brown headed cowbirds"

Individual variation in animal mate choice can be attributed to factors inherent in both signal senders and receivers. For example, different experiences between receivers (typically females) during the mating process (i.e. exposure to high or low quality mates) could lead to differences in mate-choice. The mate assurance hypothesis posits that receivers balance the benefits and costs of mating by maximizing the probability of finding a mate when mates are rare, but optimizing mating quality when mates are common. Therefore, females become less choosy when preferred males are rare or absent, but they become choosier when preferred males are abundant. In the current study, we tested this hypothesis with brown headed cowbirds (Molothrus ater) using duration and latency of the copulation solicitation display (CSD) as a measure of females' motivation in mating. Brown headed cowbirds are a great model system in mate choice studies because of their large social network, and abundant research has shown that

experience can modulate their behavior. We used 12 different male displays that could be broken into four different categories with varying song potency and visual display intensity. The song potency was determined based on the extent to which the songs consistently elicit CSD response from female birds, and the visual display intensity was determined by the presence or absence of bows. We predicted that the higher number of high-potency songs the female cowbirds have heard, the shorter the duration of CSD they give. Our data support the mate assurance hypothesis: there is a negative correlation between the CSD duration and number of high-potency songs the females have heard ($P<0.001$); Additionally, we found there is a significant positive correlation between the number of high-potency songs and the latency to give a CSD ($P<0.001$)—meaning that the female cowbirds are more reluctant to give a CSD when the number of high-potency songs they hear increases.

College of Technology

Poster Number 202: Olivia Brino, Doug Demorotski, Tim Sayre, Jared Schroering

"Visual Inspections With The Use Of UAS And Infrared Imaging"

In the world of commercial aviation, visual inspections of aircraft take a substantial amount of time and effort. The amount of time it takes to perform the visual inspection causes a loss in profit during aircraft down time, compounded with the already high cost of maintenance. The process required by a governing company to complete an 'A' check visual inspection of its aircraft requires anywhere between 10-20 man hours. Also human factors, such as, stress and pressure to meet time requirements can play a detrimental role to the accuracy and safety of the visual inspection. With new composite aircraft entering the market there is a significant issue with determining accurate and efficient material lifespan of those aircraft structures. Time and money are problematic factors in composite aircraft due to lack of research data, such as, optimizing set timing of inspection intervals and knowing common areas for various defects. / / The proposed solution is to use quadcopters equipped with infrared imaging cameras flying coordinated flight plans around the fuselage of commercial aircraft, take images, and compile the visual data for an aviation mechanic. The images taken of both aluminum and composite materials are in varying spectrums. This allows shorter inspection completion time, wider range of defect detection, reliability, and data collection. This experiment is creating a new and improved method of visual inspections on aircraft that can be utilized as a way for airline companies to reduce maintenance time, cost, safety risks, as well as, a teaching tool for Purdue professors. /

Poster Number 203: Aaron Hoover

"Applications of Scanning Probe Microscopy"

The scanning probe microscope (SPM) has become an important tool in the exploration of the nano-scale regime. The motivation behind this project is to understand SPM techniques for advanced investigations of biomaterials. Using the Bruker Innova SPM, initial training of the system and practice scanning a calibration grid introduced fundamental knowledge of Atomic Force Microscopy (AFM) such as the basic principles, mechanics and operation of the system, as well as analysis of the data after completion of a scan. Samples of interest were scanned such as a printed circuit board (PCB), stainless steel, a eukaryotic stoma, and an aerogel. Analysis of each sample previously stated and further investigations of different techniques with the SPM, specifically Electrostatic and Magnetic Force Microscopy (EFM & MFM) are shown. The fundamentals of how both techniques operate and the benefits into learning these methods play an important role into future work with EFM and MFM experiments that will be conducted to understand physical properties of biomaterials.

Poster Number 204: Van Masterson

"Triple-Negative Breast Cancer Treatment Using Electrochemotherapy"

One million new cases of breast cancer occur each year worldwide. Over 200,000 of these cases occur in the US alone. With a woman dying every minute worldwide (one every 12 minutes in the US) and because of the poor drug response of the commonly administered breast cancer chemo drugs, there is a critical need for alternative treatments for patients for whom the current standard of care does not work. There is a critical need for alternative therapies and electrical-pulse-mediated chemotherapy, known as electrochemotherapy has the potential to treat triple negative breast cancer, meaning estrogen receptor (ER) negative, progesterone receptor (PR) negative and her2 negative. So, it is very difficult to kill these cells and they are also chemo-resistant. To address this problem, we studied the effect of Gemcitabine, along with 1200V/cm, 100μs (8 pulses at one second interval) and 500V/cm, 25ms (2 pulses at one second

interval) pulses on MDA-MB-231 triple negative breast cancer cells. Gemcitabine concentration used was 100μM. The results so far show that high energy pulses are the most effective at killing the MDA-MB-231 cancer cells. / /

Poster Number 205: Heather Newcomer, Bobby White, Art Williamson

"Creating a Reliable Gas Dispersion System for Purdue's Biowall"

There is need for a reliable way to introduce and measure the volatile organic compounds (VOCs) in a biowall over a specific amount of time. The biowall is a living plant wall integrated into an HVAC system. This plant wall acts as the filter in the HVAC system, filtering out the unwanted contaminants. If the VOCs can be repeatedly introduced and measured at or near the same quantity throughout a specific amount of time the effects that a biowall has on indoor air quality (IAQ) can be evaluated. The Biowall VOC Testing Team shall develop, design, test and demonstrate a working system that can reliably introduce and monitor the VOC concentration over time. Operation of the system shall be controlled remotely through a LabVIEWsystem that shall interface directly with the existing software. Both the time interval for measurement and the concentration level shall be variable based on user control of the LabVIEW software. Data from the sensor(s) will be logged on the main panel display and logged into an Excel file for later evaluation.

Poster Number 206: Matthew Northrup

"Steady State Flow Forces In A Hydraulic Spool Valve"

Hydraulic systems function in many industries and yet few notice their presence. However, without them everything from automobiles to jets wouldn't be able to operate. While these systems are extremely common, much is still unknown about their true inner workings. / A high-speed jet flowing inside a partially-open hydraulic valve is accompanied by a reaction force, also referred to as a flow force. It is the belief of the author that the nature of this force is yet undetermined despite an extensive research effort spanning many decades. The momentum theory on flow forces by Lee and Blackburn (1952) explains the flow force origin and offers a design solution to shape the valve spool as a turbine

bucket. It provides a model to calculate the compensated flow force as well. However, the model used for modern day valve spool design, which is based off this paper, doesn't account for the different flow case due to incorrect assumptions made. / A detailed analysis of the static-pressure distribution in the valve cavity as well as a review of the literature concerning pressure loss in diffusers and nozzles demonstrates the major flaws with the current theory and attempts to correct them. The new model takes into account the compensation occurring upstream of the valve orifice, not downstream as assumed by the momentum theory. This could be applied to chamfers or notches on the valve spool without the need to machine a complete turbine-bucket profile. / Many would view the current model to be correct due to the numerous functional hydraulic devices currently in the market. However, an improvement on the basics of hydraulic flow would allow for a drastic improvement in efficiency due to a compounding effect from the bottom to top level of future designs.

Krannert School of Management

Poster Number 208: Shiqi Liu, Constanza March, Uplie Mandiwa, Anna Triscari, Xinyu Zhang, Yefei Wang

"Baan Tawai - The Village of Handicraft"

Alone with other groups from International marketing class, we will help building brand awareness of Baan Tawai and its dedicated handicrafts as a whole. Under the supervision of professor Chad Allred, we will showcase events other group arranged to praise artisans and their crafts which includes assisting artisans build strong portfolio to participate in international woodcarving competition; negotiating shipping cost with local shipping agency for visitors; collaborating with Purdue study aboard program to offer study aboard opportunity to baan Tawai; All the events will be included in our projects and we will be able to accomplish our projects by contacting Thai officials from Chang Mai University and by researching based on many other student groups from previous international marketing courses.

Poster Number 210: Jyotika Tuhan, Abisoye Adebayo, Melanie Lewis

"SoyCAP"

This is a soy based cloth that has been treated with cold atmospheric plasma to repel dust and debris. This can be used as an air filter.

Thank you for joining us in celebrating the undergraduate research here at Purdue!