UNDERGRADUATE RESEARCH & POSTER SYMPOSIUM

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ABSTRACTS

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PURDUE UNIVERSITY

Undergraduate Research & Poster Symposium 2017

Student Abstracts

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College of Agriculture

Innovative Technology/Entrepreneurship/Design

Poster Number 50: Tiffeny Spindler

The Impact of Soilless Media on Strawberry Growth and Fruit Production

Soilless medias are used in hydroponic greenhouse environments for sustainability, efficiency, and environmental control. Soilless medias are substrates that can be used in place of soil, usually in a hydroponic environment. Most soilless medias utilize water and nutrients more efficiently than soil (Barrett et al. 2016). The aim of this experiment was to compare different soilless media on strawberry growth and fruit production in a hydroponic environment. Four different medias were chosen, three of which are conventional. The conventional medias are coconut fiber (coir), Steadygrow, and Rockwool. One media is a ground parboiled rice hull mixture. This media was chosen as a potentially more environmentally friendly option for growers. Four replications of each media were used. Strawberry propagules were transplanted once they were established. A drip irrigation/fertilizer injection system was used to deliver water and nutrients to the plants. Strawberry growth data and fruit yield data were recorded. At the conclusion of the experiment, total fresh and dry weights of the plants along with leaf area were taken. When comparing the different medias, the fruit fresh weight and yield were both considerably higher for the coconut coir and the rice hull mixture. Growth parameters showed that many of the measurements taken, such as height and leaf count, were relatively the same between different medias.

Life Science

Poster Number 1: Stephanie Bauer

Evaluating the Sub-lethal Effects of Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) Mixtures on Lithobates catesbeianus Tadpoles

Exposure to PFOS and PFOA at these concentrations did not have an effect on survival but did effect growth and development
Mixtures of PFOS and PFOA have a larger effect than individual PFCs
T3 concentrations from tissue homogenate and blood serum samples will be analyzed to determine endocrine effects

Poster Number 2: Nicolas Bland, Osamudiamen Ogbeifun

Effects of fat-aging on chemical and quality attributes of ground beef patty

Postmortem aging has been extensively practiced in the meat industry, as it considerably improves eating quality attributes, such as tenderness, juiciness and/or flavor. While volatile compounds from fatty acids play a central role in contributing flavor development of aged meat, there is little to no information how fat-aging would affect quality attributes of meat. Therefore, the objective of this study was to determine the effects of fat-aging on physicochemical and textural properties of ground beef patties. At 7 days postmortem, beef round muscle and backfat were collected. Beef fat was randomly assigned into five groups as follows; control (unaged-fat), wet-aged fat for 2 weeks (2WA; in vacuum bags) or 4 weeks (4WA) and dry-aged fat for 2 weeks (2DA; without packaging material) and 4 weeks (4DA) in a chilling room at 1 ºC and 80% relative humidity. Beef patties were formulated with 80% ground beef lean and 20% each aged-fat. The experimental design was a completely randomized block with three independent batches. The addition of aged-fat slightly decrease pH value of beef patties ($P<0.05$). However, proximate composition and cooking yield of beef patties were unaffected by the inclusion of aged-fat ($P>0.05$). The addition of aged-fat for 4 weeks (4DA or 4WA) resulted in significantly higher hardness, gumminess, and chewiness of beef patties than control formulated with unaged-fat. The results of this study shows that the addition of aged-fat had little impacts on chemical composition of beef patties, but caused considerably different textural properties.

Life Science

Poster Number 3: Jacob Bosler, Elizabeth Canida, Yvonne Chen

Gene Expression Prediction of Bacteriophage AFIS 8000bp-16000bp

This project aims at contributing new mycobacteriophage genomes to databases and literatures. The objective is to characterize, investigate and annotate genes in order to predict gene expression for the mycobacterium phage AFIS (Cluster A1). The annotation of the AFIS genome contributes to the Actinobacteriophage Database (phagesdb.org). The investigation includes calling, evaluating genes and assigning gene functions by using multiple annotation and analysis softwares including DNA Master, Phamerator, and Genemark. The coding potential for each gene is compared between Genemark and DNA Master. Once, a start codon is decided based on the evidence from these software clients, a function called BLAST on DNA Master is used to find similar genes across sequenced genomes in the same cluster. The specific investigated section of the AFIS genome is 8000bp to 16000bp. DNA Master, referencing

Glimmer and GeneMark databases, auto-annotated this part of the genome to have 12 genes. After calling each gene, no additional genes needed to be added. A new start codon was assigned for gene 18. A +1 frameshift was found and recorded in gene 23. All of the other genes within this section aligned at least %90 with another phage gene in the database; this is due to the genes being structural proteins, which will be similar to most mycobacteriophage in Cluster A1. Functions of genes 12 to 15 significantly vary. Gene 16 functions as hypothetical protein, gene 17 to 19 are unknown. Genes 20 to 23 function as proteins relevant to tail assembly and communication.

Life Science

Poster Number 4: Kelsey Bullens

Characterization of Left-Ventricular Thrombus Formation Using High Frequency Ultrasound

Heart failure is a leading cause of death in the United States, and cardiac thrombus, a common morbidity associated with heart failure, significantly increases a patient's risk of embolic events. The objective of this project is to characterize left-ventricular (LV) thrombus development using high frequency ultrasound imaging in a murine model. C57BL/6J wild-type mice (n=6) were injected intraperitoneally with iron dextran five times a week for six weeks to increase oxidative stress in the heart. Granulocyte-colony stimulating factor (G-CSF) was subcutaneously injected daily during the second week to initiate stem cell migration and stimulate endothelial cell activation, thus increasing the hypercoagulability state of the blood. A high-frequency, small animal ultrasound system (Vevo2100, VisualSonics FUJIFILM Inc.) and a 40 MHz central frequency transducer were used to track LV thrombus progression and evaluate LV function weekly. Four out of six mice developed thrombus, but no significant differences in LV performance were observed when compared to mice that did not form a thrombus. Further investigation is necessary to study the role of attenuated heart function on thrombus formation. Future work will incorporate a murine model of myocardial infarction to investigate if a severely compromised heart increases the risk of or accelerates LV thrombus formation. This study will aid in identifying patients who are predisposed to thrombus formation following a heart attack, leading to more effective prevention and treatment methods.

Life Science

Poster Number 5: Ashlyn Burns

Public Perceptions of Entomophagy & Viability of Sustainable Insect Farming

As the global population continues to grow, food security becomes an increasing concern. In order to meet rising demand for food production, finding new methods of sustainable

agriculture is more important than ever. The benefits of consuming insects are clear but often overlooked in Western cultures. This research study attempted to understand the psychological barriers preventing insects from being exploited as a food source, and surveyed public attitudes towards eating insects in order to determine if entomophagy has the potential to be accepted in the United States. This study also explored the viability of an insect microfarm rearing mealworms for human consumption as a form of sustainable agriculture in order to combat food security.

Life Science

Poster Number 6: Yufan Chao

Effect of probiotic feeding on lipid oxidation stability and heat shock protein activity in breast muscle from chickens exposed to chronic heat stress

Heat stress is an environmental stressor reducing the productivity and meat quality of broiler chicken. Our recent study found that the supplementation of dietary probiotics could ameliorate meat quality defects of heat-stressed chicken. However, underlying mechanisms of probiotic feeding for enhancing oxidation stability have been unknown. Heat shock proteins (HSPs), which are chaperon proteins produced in response to heat stress, could be potentially related to oxidation stability in skeletal muscle by interfering with apoptosis mechanism. Therefore, the objective of this study was to determine the impact of probiotic feeding on lipid oxidation stability and HSP expression in breast muscle from heat-stressed chickens. This study was designed using 2 (control at 21ºC vs heat stress at 32ºC/10 hr/day) Ã— 2 (regular diet vs regular diet plus 250 ppm of B. subtilis) factorials. Forty-eight chickens (12 birds/treatment, n=6) were harvested at day 46, and breast muscles were collected at 1 day postmortem. Probiotic feeding significantly decreased 2-thiobarbituric acid reactive substances and phospholipid contents in heat-stressed chicken. Heat stress increased HSP 70 activity in chicken breast (P=0.08), whereas probiotic feeding had no significant effects. Qualitative analysis on HSP 27 showed a higher activity of HSP 27 from heat-stressed chicken coupled with probiotics feeding compared to their counterparts. The results of this study indicate that probiotic feeding could alleviate oxidative deterioration of breast muscle from heat-stressed chicken, and further studies determining the expression of other regulatory proteins involved in oxidative metabolisms, such as HSP 20, caspase and cytochrome c, would be highly warranted.

Poster Number 7: Kurt Laurence Cheng

Impact of Interest Rate, Exchange Rate and Price Changes on the Farm Capital Investment for Intermediate Livestock Farms

With the United States set to see increased interest rates, the appreciation of the dollar, and changing trends for the prices of livestock, it bears great importance to see how these factors will affect the livestock farming industry. Due to the decreasing number of intermediate farms over time, this study primarily focuses on the impacts of these factors on the investment of these more vulnerable farms. This study makes use of data originating from the USDA Agricultural Resource Management Survey or otherwise known as ARMS from the years 1996 to 2013. The outcomes of this study are meant to show the overall effects of these three factors on the farm capital investment for intermediate farms, and whether or not there is a need for substantial action to aid these farms due to the changes in both the environmental and market conditions.

Life Science

Poster Number 8: Lesley Cline

Methods to Reduce Internal Temperature Extremes in Small Mammal Research

Sherman live traps are one of the most widely used and accepted trap designs in wildlife research, especially for small mammals. These traps are easy to assemble and deploy in the field but fail to provide adequate protection for trapped animals from temperature extremes. Our objective was to examine the effects of habitat and seasonal differences on internal temperatures of Sherman live traps with and without protective measures used by other researchers. We implemented 3 treatments: an insulated aluminum foil sleeve, a roofing shingle, and a control. The field work was conducted at 3 Purdue University satellite properties that represented 5 different habitat types (coniferous forest, row-crop agriculture, restored tall-grass prairie, mature deciduous forest, and early successional deciduous forest). Our field work is conducted in all 4 seasons; thus far, the fall and winter data have been collected. At each habitat site, we deploy 3 replicates of the 3 trap treatments. Within each trap, we place iButton temperature loggers programmed to record every 15 minutes. Preliminary results from the fall and winter samples suggest that habitat types influence the temperature extremes experienced by traps and there are seen significant differences in temperature minima across treatments. This study will contribute to the future of live-trapping small mammals. If we can manipulate live traps to eliminate temperature related stressors during trapped periods, future studies could become more humane for small mammal research.

Life Science

Poster Number 9: Audrey Conrad, Francesca Whitt, Brittany Reyes, Emily Kerstiens

Mycobacteriophage AFIS Genome Analysis

Mycobacteriophage are viruses that infect mycobacteria hosts in order to reproduce. It is critical to study these mycobacteriophage because they exist in as many as 1031 particles, making them genetically diverse. Due to having so many mycobacteriophages present globally, there is a great opportunity for new discovery because of the immense diversity. During IT 226 our teams isolated a unique phage from the environment and were tasked with determining its overall function. We then extracted phage DNA which was sent off to a sequencing laboratory, adding its data to an international database. Starting this semester, we were given the DNA of a phage and are now working to analyze its genome. The phage we were given is called AFIS, found at Purdue in 2014 and sequenced by Pittsburgh Bacteriophage Institute. AFIS is of the DNA cluster A, subcluster A1. We have been studying the genome using a computer program called DNA Master. At the beginning of the semester our team completed an auto-annotation of the AFIS genome using DNA Master. The auto-annotation gave us the predicted gene start and stop sites. However, the program is not always correct, in some cases we had to change start sites and even deleted a gene. Our section of the genome has genes coding for DNA primase and helicase, which are shared by another phage Trouble. At the end of this project, we will have a finalized genome with function analysis for each gene in the AFIS genome in comparison to other known phage.

Life Science

Poster Number 10: Katerina D'Addato

A comparison of the effectiveness of size restriction on snappers Lutjanidae and no-take policy on parrotfish Scaridae

The coral reef system on the island of South Caicos has a very rich diversity of commercially important species. Conch (Lobatus gigas) and spiny lobster (Panulirus argus) have been over exploited to the point where restrictions are so tight, local fishermen have shifted their focus to fin fish. The fin fish industry has a high level of importance to the livelihoods of fishermen within the Turks and Caicos Islands in South Caicos. The parrotfish (Scaridae) are a key species in maintaining the health of the corals in reefs, and snappers (Lutjanidae) are a fin fish important to reef trophic levels. A no-take policy was established on parrotfish in 2011, and a minimum size restriction of 7 in. (17.8 cm) was established for snapper in 2015. The objective in my research question was to see how effective these two regulations were in offering protection to these fish. The abundance and size of the fish being landed at the dock was

compared to the abundance and size of fish in the reef habitat at sites located both inside and outside of the Marine Protected Areas (MPAs) on South Caicos. The placement of the size restriction appears to have no effect on the size range that fishermen are targeting with snapper, and subsequently is not providing any level of protection to the snapper populations within the South Caicos ecosystems. The no-take policy appears to be successful in promoting parrotfish presence on the reef and preventing removal.

Life Science

Poster Number 12: Sarah Elefson

An Evaluation of the Emotional and Psychosocial Outcomes of Service Dogs on their Recipients

Introduction. Qualitative evidence suggests that service dogs may have a positive impact on their recipients' mental health, but there are few quantitative studies about the effects of service dogs on emotional and psychosocial well-being. The emotional and psychosocial well-being of a person with a chronic condition is often overlooked because many people focus on the physical tasks that service dogs perform.

Methods. To empirically measure the benefits that service dogs had on the mental health and well-being of their recipients, a cross-sectional survey containing standardized self-reporting assessments was administered to service dog recipients (n = 100, 63.00% female) and individuals on a waitlist (n = 57, 77.20% female). The average age for the service dog recipients was 33.63 (SD=15.78, range: 13-68) years and 39.02 (SD=15.75, range: 6-71) years for the waitlist participants. Common disabilities in the sample were epilepsy (35.3%), cerebral palsy (30.3%), and Duchenne muscular dystrophy (29.8%).

Results. The preliminary data suggest that service dogs had a positive impact on emotional quality of life (M=10.12, SD=3.40), t(143)=3.08, p=0.003, social quality of life (M=8.93, SD=3.44), t(141)=2.67, p=0.011, and work/school quality of life (M=12.53, SD=4.78), t(129)=2.61, p=0.018. There was no significant change in anger, companionship, and sleep (p≥0.075). Overall quality of life was higher (M=11.56, SD=2.66), t(143)=4.43, p=0.000 for service dog recipients when compared to participants on the waitlist.

Conclusions. Results suggest that service dogs may have beneficial effects on the emotional and psychosocial health of their recipients.

Poster Number 13: MaryGrace Erickson

In Search of an Optimal Glucose Tolerance Testing Protocol for Assessing Glucose Kinetics and Metabolic Status in Dairy Cows

Compromised regulation of glucose metabolism in dairy cows is often linked to metabolic disorders including ketosis and hepatic lipidosis. Glucose tolerance testing (GTT) is commonly used as an experimental and clinical diagnostic tool for assessing glucose homeostasis and disease in many species but standardized protocols do not exist for GTT in dairy cattle. Accurate assessment of glucose kinetics is critical to identifying and developing strategies that reduce metabolic disease and ultimately maximize productive efficiency and animal well-being. We hypothesize that an optimal GTT methodology exists for dairy cattle which accurately reflects glucose clearance kinetics and can be standardized as an investigative and diagnostic tool. Our objective is to identify the variation that exists in the published literature for GTT testing in dairy cattle and to identify the protocol parameters that require standardization. The peer-reviewed literature published between 2007 and 2017 was analyzed to determine the test parameters that have been used previously to evaluate glucose clearance in cattle. A total of 19 studies were used to identify the range of glucose dose and sampling times used. Doses administered ranged from 0.15g/kg BW to 0.5g/kg BW. This range for cattle was similar to doses used for rodent intraperitoneal and human oral GTTs when scaled on a metabolic bodyweight basis. Dose levels of 0.15, 0.3, and 0.6g/kg BW were identified for further evaluation using a replicated Latin square and 6 early lactation dairy cows. We will evaluate the effect of dose on plasma glucose peak, clearance rate, area under curve, and half-life of the glucose excursion curve. We anticipate an optimal dose exists. Further we will determine the relationship between dose and response curve characteristics. We predict more definitive guidelines for administering and interpreting GTT in dairy cattle will facilitate use of GTT as an experimental diagnostic tool for assessing cow health.

Life Science

Poster Number 14: Nicholas Fields, Sarah Bell, Carly Richards, Gillian Smith, Kate Carpenter

AFIS Gene Annotation: basepairs 49,000-51,737

Phage genome research has been rapidly progressing in an effort to better understand the nature of the genomic code. Given that an approximate 1031 phage particles occupy the biosphere, bacteriophage provide readily available and relevant materials to study genomes. The class annotated the genome of AFIS, a bacteriophage discovered in West Lafayette, Indiana by Purdue student researchers. The group was assigned annotating nucleic bases 40900-51737, which contained genes 61-89. To begin, auto annotation was run with DNA Master program

followed by BLASTing the genome using both Glimmer and GeneMark with preference given to GeneMark. Each gene was reviewed and edited to follow Guiding Principles of Bacteriophage Genome Annotation as outlined in the 2015 DNA Master Annotation Guide. Genes were first checked for coding potential. Once the genome was BLASTed, each start per called gene needed to be reviewed to capture the highest amount of coding potential.

Since the section allocated to the group was at the end of the gene code, the variation between this section of genes and its family were not conserved. For this reason, Phamerator was not a significantly useful annotation tool, and much of the analysis derived from the coding potentials seen in Gene Mark and the concluding Glimmer scores. Finally, the genes located at the end of the genome had unclosable gaps, which contributes to the variation between genomes in this family. These small-length genes are unique to AFIS alone.

When looking for functions for genes nearing the end of the genome, many were discovered to be hypothetical and lacked the evidence to be considered as a specific function. Of the 29 genes that were called, only six had evidence, even if that evidence was circumstantial, pertaining to a specific function. This proves the need for further study into genes and their functions towards the end of the genome, due to that the classification will lead to knowing the specific function of each phage.

Life Science

Poster Number 15: Hayly Goebel

Hypoxic Conditions Improve Development of Parthenogenically Activated Porcine Embryos

In vitro embryo production (IVP) protocols have been established in many species including swine. Parameters to evaluate IVP systems include cleavage rate, blastocyst rate and the number of nuclei of embryos. Blastocyst formation is crucial for embryo development and an indicator for the efficiency of the system. In an effort to increase blastocyst formation, we tested the effects of different incubation environments on embryo development using a hypoxic chamber. Oocytes were collected via aspiration of follicular fluid, selected for density of cumulus cells and cytoplasm morphology, and randomly divided into two equal groups before activation and a seven day culturation period. Hoechst staining was performed to assess the number of nuclei. Group I was incubated at 39ï¿½°C, 5% CO_2 in a humidified atmosphere, Group II was placed in the Hypoxic chamber with oxygen levels decreased to 5%. Three replicates were conducted. We found an increase in morphological blastocyst formation percentages (Group I vs II, 25.95% vs 43.10%) as well as an increased average number of nuclei (n) within individual embryos (Group I (n=9.47). Group II (n=13.44)) under Hypoxic conditions. Our experiment data indicates that embryo culture under hypoxic conditions is beneficial to the outcome of IVP protocols.

Poster Number 16: Nicole Gonzalez

Biomarkers for Triple-Negative Breast Cancer in African American Women

The incidence of breast cancer in AAW is much lower than those of their Caucasian counterparts. However, the age adjusted mortality rates are much greater for AAW compared to CAW. These differences in survival were attributed to socioeconomic factors and access to health care. Yet, after adjusting these differences, AAW still had lower survival rates than CAW. Genetic and immunohistochemical studies have revealed that biological variations may account for this disparity. These studies have suggested as a causative: a higher prevalence of basal-like tumors in premenopausal AAW and low prevalence of luminal tumor. These are characterized by being high-grade aggressive tumors that are ER-(estrogen), PR-(progesterone), HER-2 +/- (human epidermal growth); with high rate of lymph node involvement. Despite this understanding, there is little evidence to indicate which genetic or non-genetic factors contribute to causing aggressive breast cancer thereby limiting the development of prevention and treatment option. We proposed that the phenotypic diversity of breast cancer might be accompanied by a corresponding diversity in protein expression patterns that can be reveal using proteomic technologies. We hypothesized that in addition to ER- and PR-, and the absence in expression of HER-2, the protein composition of triple-negative tumors varies among African-American and Caucasian. Two-dimensional gel electrophoresis, mass spectrophotometry and data analysis of protein from breast cancer tissues were used to identify differentially expressed proteins from African American and Caucasian women. Western blot of luminal and TNBC cell lines were used to confirm the expression of identified proteins. We have found that many proteins were differentially expressed in AAW breast cancer tissues compared to CAW. One of these is lactate dehydrogenase which was found to be overexpressed in tissues from AAW. Western blot analysis confirmed expression.

Poster Number 17: Sarah Gutman

Serological Investigation of Exposure to Influenza A Virus in Dogs and Cats in the U.S.

Canine Influenza Virus (CIV) H3N2 is a subtype of Influenza A Virus (IAV) of avian lineage that originated in Asia. Recently, CIV H3N2 has been of interest due to a widespread, sudden outbreak in the Chicago, IL region in April of 2015. The aim of this study was to investigate the associated risk factors and prevalence of antibodies against IAV and CIV H3N2 in serum samples collected from randomly selected dogs and cats native to various U.S. states. These samples were obtained from the Purdue University Small Animal Hospital. In order to measure the

seroprevalence of antibodies against CIV H3N2 in the 458 canine and 67 feline samples, a commercial enzyme-linked immunosorbent assay (ELISA) and in-house hemagglutination inhibition (HI) test were utilized. Using ROC Analysis of the results, it was determined at a 100.00% sensitivity and 98.07% specificity that the optimal HI cutoff titer was 1:32. From the HI results, it was found that dogs had a 2.21% seropositivity for CIV H3N2 while 8.96% of cats were seropositive. At this time, there were no apparent trends found between seroprevalence and associated risk factors of the animals. With this, it was concluded that CIV H3N2 is not widespread in the Chicago area and Midwest region, but the virus should still be kept under surveillance because of its versatile ability to re-assort and spread as a more virulent strain.

Life Science

Poster Number 18: Lydia Hall

Comparison of Rapid Salmonella Culture Detection Methods

Salmonella enterica is a well-known pathogen which can contaminate Large Animal Veterinary Teaching Hospitals. A previously published study concluded that the use of electrostatic wipes instead of sponges for sampling the hospitals environment may be a more effective method routine surveillance testing. Although more effective, the study used a unique and longer bacterial culture method for detection. This study aimed to compare bacterial culture methods against previously published procedures to establish rapid and sensitive detection of Salmonella enterica contamination. The study design used laboratory based triplicate comparison of 5 different culture methods for the detection of low levels (103; 102; 101; & 100 colony forming units per mL) of Salmonella enterica utilizing Blood Agar, Buffered Peptone Water (BPW), Tetrathionate Broth with Iodine (Tet), Rappaport-Vassiliadis R10 Broth (RVR-10), Variable Day Incubation (24hr or 48hr per culture media), and XLT4-agar plates (XLT-4) in a 6 day trial as shown below: Preliminary results show that Method 4 and 5 can most effectively and equally detect down to the 101 dilution. These results found that the use of RVR-10 is not necessary for effective detection, although the full 6 day culture incubation is still needed for low level Salmonella detection. Next steps may include coupling Veterinary Hospital based samples to confirm that RVR-10 is unnecessary when electrostatic wipes are used for sampling.

Life Science

Poster Number 19: Arryn Harris, Peyton Spreacker, Amy Bowman, Ben Anderson

Analyzing Mutations of Spt7 Protein That Disrupt Interaction with SF3B Subunits

Proper transcription, the process of converting DNA to RNA, is crucial for the health and viability of an organism. This process is regulated by many proteins, such as co-transcriptional

activators; one being the protein complex known as Spt-Ada-Gcn5-acetyltransferase, or SAGA. While much is known about the roles of SAGA in cell processes, how SAGA's subunits promote functionality is still unknown. The focus of this study is to analyze the purpose of SAGA's SF3B subunits. These subunits are also found in the spliceosome, the compound responsible for generating mature RNA. SAGA has no known functions relating to this process, so the reason the SF3B components are in SAGA is unclear. Spt7, another SAGA subunit, interacts with both SF3B subunits. In this study, a yeast two hybrid assay was performed where different Spt7 mutants were screened. This was done by transforming yeast with Spt7 mutants, analyzing the protein interactions and sequencing the mutants to determine their mutations. A key result of this study is in the determining that the two SF3B subunits interact with different regions of Spt7. Although the overall goal is to find an Spt7 mutant that does not interact with the SF3B components but still maintains interaction with other SAGA subunits, we now have a better idea of what type of Spt7 mutant is needed. This discovery will lay the foundation for future experiments where a mutated SAGA with no SF3B components will be expressed in Drosophila melanogaster and analyzed to determine the function of SF3B subunits in SAGA.

Life Science

Poster Number 20: Margaret Hegwood, Erin Paul, Danielle Krug, Celine Chang

Investigation and Annotation of Mycobacteriophage Genomes

This semester our team studied and characterized the genome of a single phage, JewelBug, using various bioinformatics software for both annotation and analysis. Software used included DNA Master, an annotating and analyzing program used to generate an auto-annotation of the phage genome. Additionally, gene calls were generated using GeneMark and Glimmer with tRNAs found and evaluated by Aragorn and tRNAscan-SE within DNA Master. Following auto-annotation, the JewelBug genome was further refined using manual annotation via evidence found from the associated generated Phamerator and GeneMark maps. Through careful study and ample evidence, the genome was edited and finalized to include alternative start sites, identify missing or erroneous genes, and determine gene function.

Life Science

Poster Number 21: Jeffrey Helfrich

Impact of Stage of Production on Blood Glucose Concentrations in Brown and White Laying Hens

Impact of Stage of Production on Blood Glucose Concentrations in Brown and White Laying Hens

Laying hens maintain extreme levels of egg production throughout most of their lives. Due to the demanding needs of egg formation and laying, it is important that we detect and observe the physiology under the process in these birds. Glucose is arguably one of the most important physiological nutrients in the body, and currently, there is a lack of adequate information and research documenting the blood glucose concentrations in the production life stages of laying hens.

The purpose of this experiment was to determine if, and to what extent, blood glucose concentrations vary between the different stages of production in laying hens.

Methods:

120 LSL breed white laying hens were selected at random from a traditional cage operated laying hen facility in Indiana. Blood glucose samples were taken from 3 different groups of birds varying in production stage: starting hens at 22 weeks of age (Treatment A), peak production hens at 45 weeks of age (Treatment B), and finishing hens at 69 weeks of age (Treatment C).   40 birds from each stage were captured, and blood glucose samples were taken from the wing vein. The team collected samples in duplicate with an Agamatrix PRESTO glucometer from a single site on each bird. These values were recorded and mean blood glucose concentrations were calculated for each group.

Results:

The mean blood glucose concentrations for the hens were as follows: Treatment A 224 +/- 3.47 mg/dL, Treatment B: 225 +/- 3.47 mg/dL, Treatment C: 228 +/- 3.47 mg/dL.

Conclusion:

There was no significant difference in blood glucose concentrations among the three treatment groups. This could have arisen because of strict diet formulation, timing of feedings, and light cycle in the houses. In the future, research could be performed to see if a consistent diet (shared among the 3 groups) would show more drastic results in the blood glucose levels.

Life Science

Poster Number 22: Blair Hooser

Thyroid Disrupting Effects of Halogenated and Next Generation Chemicals on Developing Fish

Endocrine disrupting chemicals (EDCs) can alter thyroid function and have been shown to negatively affect the growth and development of organisms. Many halogenated compounds act as EDCs, including perfluorinated chemicals, which are commonly used in Teflon and food packaging, and flame retardants, which are used in a broad range of products from clothing to electronics. Due to the adverse effects of these compounds, there is a need for next generation, alternative compounds which are less toxic. The objective of this study is to further test the next generation of alternative compounds for their endocrine disrupting activities. In these studies, zebrafish embryos were exposed to the test compounds due to the high functional and structural similarities they share to higher vertebrates and their suitability for early development studies. We tested the thyroid disrupting potential of three well known toxic

EDCs, perfluorooctanoic acid (PFOA), tris (1,3-dichloro-2-propyl) phosphate (TDCPP) and tetrabromobisphenal A (TBBPA), and two next generation chemicals, 9,10-Dihydro-9-oxa-10-phosphaphenanthrene 10-oxide (DOPO) and perfluorobutyric acid (PFBA). Effects on swim bladder (SB) development were measured as endpoints of thyroid toxicity. Specifically, changes in the surface area of the swim bladder, as well as changes in expression levels of genes involved in thyroid regulation were measured. Acute, 6 days post fertilization (dpf), and chronic, 28dpf, exposures were conducted at 1% of the concentration required to kill 50% of the population (LC50) of all chemicals that were tested. Although the specific toxic mechanisms are still unclear, our findings suggest a developmental delay in embryos that were exposed to sublethal concentrations. Additionally, we tested our findings further by studying the effects in Japanese medaka. In this, we observed SB over inflation, but only in females, which suggests gender differences in SB regulation.

Life Science

Poster Number 23: Lauren Jankowski, Russell House, Meredith Roush, Lauren Primer

Characterization and Genome Analysis of a Novel Bacteriophage

Mycobacteriophage, or "bacteria eaters" in Latin, are viruses that specifically target and infect mycobacterial hosts. They have the most diverse and abundant population of all biological organisms with an estimated 10^{31} particles and up to 10^{24} infections per second, globally. Prior to the application of bacteriophage, phage must characterized and their genomes must be annotated. This research addresses the specific characterization and genome annotation of a phage, capable of lysing Mycobacterium smegmatis. The phage was extracted from a soil sample found in West Lafayette, Indiana, purified, and amplified to increase concentration. The DNA was then extracted and sequenced. Using various gene annotation software platforms, including DNA Master, GeneMark, and Phamerator, genes within a specific region of the genome were called. The procedure followed a general iterative method of finding the suggested start site of a particular gene, identifying the coding potential and ensuring that the selected start site included all potential, and implementing comparative genome analysis with other phage in the same subcluster. After finalizing the gene calls, HHPred and NCBI BLASTp were used to determine the function of each gene. The result of this work was an annotated genome, to be submitted to the National Center for Biotechnology Information GenBank Database. This research provides additional information for further bacteriophage investigation and serves as a resource for the annotation of other genomes. Though a seemingly small contribution, the accumulation of many such contributions will allow for significant advancements in the use of bacteriophage.

Poster Number 24: Brian Kerestes

A Comparative Analysis of Insect Presence in Conventionally and Organically Grown Soybeans

A comparative analysis of insect populations in conventionally and organically grown soybeans was conducted during the 2016 growing season in the north-central region of Illinois. Sweep net collections were maintained and analyzed to determine whether significant differences exist in the overall insect population of conventional and organically raised soybean plots, and which insect taxa are significantly different. A literature review of pertinent topics was conducted prior to the analysis. While the resulting data were not statistically significant, there were several predominant observations. The collected data showed that samples from the organic soybean plot contained fewer insects than the conventional soybean plot. The data supported this for all sub groups of insects except Japanese beetles (Coleoptera: Scarabaeidae) and thrips (Thysanoptera). Similar research suggested that the inability to find statistical differences in insect populations in conventionally versus organic production may be due to several factors, including monoculture plots as compared to variations in surrounding environments, farm management practices, and soil condition and health.

Life Science

Poster Number 25: Sarah Kilhoffer, Diane Besich, Rachel Markowicz

Bacteriophage Genome Analysis

Bacteriophages are a growing source of interest for a range of topics within the scientific field. Research into Bacteriophages may help find new techniques for solving new antibiotic resistances and longtime battles against bacteria causing diseases such as tuberculosis. Bacteriophages, more commonly referred to as phages, are a genetically diverse type of virus that infect bacterial hosts. There are an approximate 10^{31} phage particles globally while only about 2000 genomes have been sequenced to date. A phage genome named JewelBug with host bacterium mycobacterium smegmatis was isolated from a soil sample here at Purdue University and sequenced at the Purdue Sequencing Center. JewelBug's genomic sequence was obtained for analyzation and complete annotation. Using a variety of bioinformatics tools to determine potential genes, we can map these genes and place them into specific families for further comparison against other phage genomes. The section outlined in this study is specifically the first section of the genome, 1-7000 bp. The exact genes and start sites were evaluated via DNA Master to determine the true start site. While DNA Master was the primary tool used to help analyze the genome, we also used maps from Gene Mark and Phamerator to analyze the entire genome for JewelBug. The final sequence provides important information regarding the genes and characteristics for further real life applications. The genome can also be analyzed for the functions of the individual genes. For the section of the genome in

question, many of the genome comparisons came from the bacteriophage Artemis2UCLA. The research shows that many of the genes within this section provide code for tail proteins specifically. Further analysis into JewelBug's genomic sequence will provide further insight for future bacteriophage research and its many applications.

Life Science

Poster Number 26: Andrew Kluttz

PRONE-Type ROPGEFs Function in Trichomes

ROP small GTPases participate in the regulation of various plant cellular activity, including the reorganization of the cytoskeleton for cell shape change3. The conversion of inactive ROP-GDP into the active ROP-GTP form is catalyzed by guanine nucleotide exchange factors (GEFs)1. In plants there are two types of ROPGEFs: SPIKE1 and PRONE. SPIKE1 controls trichome morphogenesis in Arabidopsis thaliana by accumulating at the cell apex. However, a live cell probe specifically binding to ROP-GTP has revealed that active ROP-GTPs are still being localized at the cell apex beyond what is being localized by SPIKE1. This indicates that other ROPGEFs, PRONE-type ROPGEFs, also are working in the same region

Life Science

Poster Number 27: Wyatt Krom

Effects of supplemental betaine to semen extenders on semen quality in boars

Supplemental betaine was evaluated in fresh and stored semen using a multifactorial design. Six boars were used in two replicates (3 weeks each), four betaine levels (0%, 0.6%, 1.2%, and 2.4%), and two days of analysis (D1 and D4 of storage). Semen analysis consisted of morphological assessment and motility/mobility evaluation. Analysis of variance was performed using the mixed procedure of SAS. Amplitude of lateral head displacement (ALH) and curvilinear velocity (VCL) had interactions for treatment by replicate (P < 0.001 and P = 0.002, respectively), and treatment by day (P = 0.016 and 0.002, respectively), with no discernable trends. In general, 2.4% betaine reduced straight-line velocity (VSL, P = 0.001) and percent straightness (STR, P = 0.035). Total motility had a treatment by day interaction (P < 0.001), where 1.2% D1 treatment was greater than 0% and 2.4% on D1 and D4, 0.6% D1 was greater compared to D1 and D4 2.4%, and 2.4% D4 was lower than all other treatments. Progressive motility had a treatment by day interaction, where 2.4% D4 was significantly lower than all other treatments, and 1.2% D1 was greater than 2.4% D1. There was a treatment by day by replicate interaction for percent normal and tail abnormalities (P = 0.021 and 0.005,

respectively), where 2.4% betaine had a reduced normal morphology and an increase in tail abnormalities. In summary, supplemental betaine in extenders may improve semen quality at 0.6% or 1.2%.

Life Science

Poster Number 28: Larissa Lee

Comparing Severe Feather Pecking Across Domesticated Turkey Lines

Injurious pecking behavior is common in domestic turkeys housed in large groups and often contributes to injuries or deaths of birds. Injurious pecking behavior includes head pecking, severe feather pecking and gentle feather pecking. Severe feather pecking, specifically, causes feather damage and feather loss which can lead to economic losses for the farmer. A relationship between genetic line and severe feather pecking behavior had not been examined previously so the goal of this study was to determine if the performance of severe feather pecking behavior differs between turkeys of a random-bred genetic line and a commercial turkey line. Eight pens of male turkeys (n= 4 pens per genetic line) were observed twice daily for 30 min. at 8:30 am and 2:00 pm at 74 and 75 days of age. Pecking behavior was recorded for every bird in the pen. Data were analyzed using GLIMMIX (SAS 9.4) to examine whether genetic lines differed in terms of: 1) the amount of time spent giving severe feather pecks per bird, 2) the number of severe feather pecks given per bird, 3) the amount of time spent receiving severe feather pecks per bird, 4) the number of severe feather pecks received per bird. The amount of time spent feather pecking per bird was higher for commercial line turkeys (2.57 Â± 0.23 sec) vs. random-bred turkeys (1.48 Â± 0.23 sec). Similarly the number of feather pecks given per bird was higher for commercial line turkeys (0.22 Â± 0.019 pecks) than for random-bred turkeys (0.16 Â± 0.017 pecks). Furthermore, the amount of time spent receiving feather pecks per bird (commercial: o.22 Â± o.019 sec; random-bred: 0.16 Â± 0.017 sec) as well as the number of feather pecks received per bird (commercial: o.22 Â± 0.017; random-bred: 0.16 Â± 0.015) were higher for commercial turkeys. Results indicate that turkeys of a commercial genetic line spend more time engaging in damaging feather pecking behavior. Therefore, differences in severe feather pecking behavior may be influenced by genetic line.

Poster Number 29: Krizia Lepiz Conejo

Effects of L-Glutamine supplementation on meat quality of porcine muscles from pigs exposed to transportation/weaning stress

Pigs exposed to transporting stress at weaning have physiological and metabolic alterations that may negatively impact growth performance and possibly meat quality. Therapeutic antibiotics or nutraceutical replacements, such as L-Glutamine, could negate stress-induced quality defects. While L-Glutamine supplementation has been known to ameliorate weaning/transportation stress by increasing immune functions, enhancing intestinal health and stimulate muscle growth, its impact on pork meat quality is largely unknown. Therefore, the objective of this study was to determine the effects of wean/transport stress and L-glutamine supplementation on pork quality attributes.

A total of 240 pigs were weaned at 21 days then transported under thermo-challenging conditions for 12 hours. Pigs were group - weighed and randomly assigned to 30 pens, fed with three different diets (non-antibiotic (10 pens), antibiotic (10 pens) and 2% L-glutamine (10 pens)) for 14 days after transporting, then fed with basal diets until market weight. After slaughter, longissimus dorsi and psoas major muscles from the right side of the carcasses were collected at 1-day postmortem and the left side counterparts were collected at 7-days postmortem. Color and water-holding capacity (WHC) were measured. L-Glutamine feeding improved WHC by exhibiting lower display loss, freeze-thaw loss, and cook loss ($P < 0.05$). L-Glutamine feeding also improved color intensity and stability ($P<0.05$). The current results suggests that L-Glutamine supplementation have better or equivalent impacts on improving meat quality attributes of wean/transport stressed pigs compared to the antibiotics treatment. Further studies looking into oxidative stability and other physicochemical attributes (e.g. texture analysis) will be warranted.

Poster Number 31: Barbara McAnulty, Kathryn Atherton, Madalyn Alm, Sarah McGinness

Annotation of Mycobacteriophage Genome

The SEA-PHAGES project is an international effort furthering the field of genetics by discovering and determining the function of novel genes from mycobacteriophage--virions that infect mycobacterial cells to reproduce. As a part of the SEA-PHAGES project, this research aims to produce an annotated genome of two mycobacteriophage to add to the growing database. During Fall 2016, various species of mycobacteriophage were extracted from environmental samples and isolated in petri dishes using aseptic technique. The Purdue Genomics Core Facility sequenced the genomes of the mycobacteriophages. The annotation of this genome as well as the associated function predictions was supported by programs such as DNA Master,

GeneMark, BLAST, Phamerator, and HHpred. These programs primarily rely on databases composed of previously cataloged genomes of related bacteriophages. Annotation skills were first practiced on a portion of the genome of the bacteriophage JewelBug as an effort to annotate the genome along with other research groups. This annotated genome can now be submitted to the GenBank database where it will be validated through wet lab testing to confirm the type and function of the projected proteins. Following validation, the genome can be compared with others from the same cluster to analyze the adaptations and evolution of the phamily. The group has begun work on a second annotation in order to complete characterization of a bacteriophage that was found Fall 2016. This research ultimately contributes to an understanding of genetics of infectious diseases with potential application in fighting antibacterial resistance and genetic engineering.

Life Science

Poster Number 33: Alexandra Nin Velez

Targeted Mutagenesis of the Smarcad1a gene in Zebrafish using the CRISPR/Cas9 system

The purpose of this project was to identify an induced mutation on the Smarcad1a gene in Zebrafish. In order to verify this, an in vitro study of the gene was conducted using zebrafish embryos. The Embryos were collected from breeding fish that had been previously injected with
sgRNA plus the Cas 9 nuclease. After the collection of these embryos the DNA was analyzed by conducting a T7 Endonuclease 1 Assay. This constituted of first performing a PCR on each of the sets of embryonic DNA. After, the DNA was Denatured and annealed, and finally a Digest was performed on the DNA in which Buffer 2 and T7E1 enzyme were added to the samples. These samples were then incubated at 37 C for a period of 60 minutes. Lastly, an electrophoretic gel was run and imaged in order to identify what embryos carried the mutation induced by the CRISPR/Cas 9 system. For this research lab, CRISPR is used as the genome editing technology, in order, to create targeted gene knockouts.

Life Science

Poster Number 34: Mary Noble

New species of Tilletiaria-like fungi isolated from Guyana

In 1967, dwelling in the decaying wood of a log in Canada, lie a fungus undocumented. It would be later described by R. J. Bandoni and B. N. Johri in 1971 as the species Tilletiaria anomala. An unusual yeast-like fungus, it was most similar to smut fungi and furthermore Ustilaginales at the time of documentation. The aspect that differentiates this species is the possession of forcibly abstracted basidiospores that come from the transversely septate basidia. Thus, a new genus was created for Tilletiaria. Since its documentation in 1972, T. anomala has been been moved from Ustilaginales to Georgefischeriales and is closely related to many Tilletiopsis species.

Currently, the role of Tilletiaria anomala in the environment is unknown due to the fact that it has only been isolated once in culture. Community sequencing projects have detected T. anomala in the intercellular fluid of rice in Japan as well as forest soils in Estonia. In the tropical rainforests of the Pakaraima Mountains in Guyana, copious numbers of isolates of an undescribed, closely-related species (possibly genus) have been made. After conducting both culture and phylogenetic studies during my undergraduate research on these isolates in Fall 2016, results suggest that they are most closely related to T. anomala but they could potentially be a new genus. In addition to this observation, all of these new isolates appear to be congeneric even though they are from numerous habitats, ranging from an abandoned mine to fern epiphytes.

Life Science

Poster Number 35: Allison O'Brien

Amphibian Susceptibility to Per- and Polyfluoroalkyl Substances

Amphibians are extremely susceptible to chemical contaminants, such as per- and polyfluoroalkyl substances (PFAs). PFAs have been used in hundreds of consumer products, such as carpeting and fire extinguishers. Research has shown that these chemicals bioaccumulate, meaning the concentration in blood and tissues increases over time. Our research focuses on the foam PFASs used in Defense Environmental Restoration Programs, which have contributed to contamination in soil, water, and sediment. Our goal was to develop toxicity reference values (TRVs) that can be used to protect even the most strongly affected species, as well as to develop models for specific amphibian taxa. We also aim to determine which life stages of specific species are most affected, as well as the differences between exposure routes. It was hypothesized that salamanders would be the most susceptible to the pollutants, while toads would be the least susceptible. It was also hypothesized that dermal exposure would be the primary method of contamination. The experiments will be conducted with different species of toads, frogs, and salamanders as specimens, using larvae and juveniles from eggs collected from natural amphibian populations. Each test group will be exposed to different chemical concentrations. A dose-response curve will be calculated and compared between species and compounds.

Life Science

Poster Number 37: Adrian Ortiz-Velez

Anaerobic fungi isolated from livestock possess characterized reservoirs of drug candidates

With drug resistance rising among infection-causing microbes, the medical and agricultural fields are in a critical need for newly classified and diverse antibiotics. Gut fungi are an unstudied family of early branching fungal species that have developed in the hindgut and ruminants of herbivores. These fungi contain a large variety of polyketide synthase(PKS)

biosynthetic pathways which have been previously have produced naturally designed antibiotics like penicillin, doxycycline, and nystatin. We have recently isolated a novel fungal species, Piromyces indianae, from fresh donkey feces. Identification was performed through a phylogenetic across the family of gut fungi and validated by morphological traits. Additionally, the first success colony PCR technique on this family of gut fungi was developed and utilized extensively during fungal identification and gene isolation. We have screened P. indianae genome for PKS genes to gain insight into the diversity of the metabolites for drug candidacy. The newly classified PKS genes will contribute to the antibiotic need in agriculture and medicine.

Life Science

Poster Number 38: Jordan Page

Cryptic Initiation in Cells With Isocitrate Dehydrogenase Mutations

Isocitrate dehydrogenase (IDH) is an enzyme in the TCA cycle responsible for the oxidative decarboxylation of isocitrate to α-ketoglutarate. Isocitrate dehydrogenase is frequently mutated in acute myleoid leukemia, prostate cancer, and colon cancer. These neomorphic mutations cause a gain of function where the enzyme catalyzes the reduction of α-ketoglutarate to R-2-hydroxyglutarate (R2HG). As a result, cells experience a significant increase in R2HG concentration which is known to inhibit Jumonji domain-containing histone demethylases of the cell. The downstream effects of this inhibition by IDH mutants are not fully understood; however, preliminary data shows cryptic initiation events occur in yeast expressing the neomorphic isocitrate dehydrogenase (IDP1 R148H in yeast). The research presented in this paper aims to identify the histone demethylase that normally suppresses cryptic initiation.

Life Science

Poster Number 40: Shelbi Perry, Gabrielle Teter

Effects of drying piglets at birth on body temperature and time to nursing their dam

Drying piglets, either with towels or a drying agent, is a management practice that is often used in the swine industry. It is assumed that drying the piglet increases its body temperature, resulting in the piglet nursing its mother closer to the time of birth. The objective of this study was to evaluate changes in body temperature and the amount of time each piglet takes from birth to nursing their mother when either towel dried immediately after birth or allowed to air dry. Flank, ear, and internal temperatures were measured on 32 piglets at birth, along with 30 and 60 minutes after birth. Piglets were placed behind the sow after temperature measurements and the amount of time between birth and their first nursing event was recorded. Data was evaluated using the MIXED procedures in SAS. Flank temperatures were

higher in the dried piglets (P = 0.007) and tended to be higher male piglets (P =0.083). Drying did not impact ear temperatures (P = 0.595). There was a treatment by time interaction for internal body temperature where body temperatures at 30 minutes were significantly higher in the dried piglets compared to the air dried piglets (P = 0.011). Time from birth to the first nursing event was not affected by drying (P = 0.646). These results suggest that drying piglets increases body temperatures at 30 minutes after farrowing without impacting the time to nursing. Due to large amounts of variation, additional animals are required to completely evaluate the time to nursing.

Life Science

Poster Number 41: Jarret Proctor

Effects of In Utero Heat Stress on Boar Growth and Reproduction Prior to, during, and after Puberty.

The objective of this study was to determine the effects of in utero heat stress (IUHS) on reproductive performance in boars. Confirmed pregnant gilts at the University of Missouri were subjected to either thermoneutral conditions or subjected to heat stress conditions. Intact males were weaned at 3 weeks of age (WOA), and transported to Purdue University (n = 5 per treatment). Anogenital distance was recorded at birth—testicular measurements and body weights (BW) were recorded monthly (3-42 WOA). Animals were trained for semen collection at 24 weeks of age and libido scores recorded. Semen was collected one time per week and evaluated for quality. Statistical ANOVA was performed using the mixed procedure of SAS 9.4. Anogenital distance at birth tended to be greater in IUHS compared to in utero thermoneutral (IUTN) boars (P = 0.065). Testicular growth rate (testicular area per week/ kg BW per week) was less during puberty (11-24 WOA; 0.703 cm2/kg BW $\pm$ 0.088 vs. 1.075 cm2/kg BW $\pm$ 0.088; P = 0.009), tended to be greater post puberty (24-42 WOA; 0.697 cm2/kg BW $\pm$ 0.088 vs. 0.464 cm2/kg BW $\pm$ 0.088; P = 0.079), and was not different prior to puberty (3-11 WOA; 0.434 cm2/kg BW $\pm$ 0.088 vs. 0.426 cm2/kg BW $\pm$ 0.088; P = 0.953) for IUHS compared to IUTN. Total sperm production per ejaculate was lower in IUHS (41.4x109 vs. 33.1 x109 $\pm$ 1.3, P < 0.001) and tail abnormalities were higher in IUHS (5.47% vs. 3.45% $\pm$ 0.64, P = 0.010) compared with IUTN. There tended to be an increased percentage of sperm with distal mid-piece reflexes in IUHS compared to IUTN (2.12% vs. 1.27% $\pm$ 0.43, P = 0.098). Amplitude of lateral head displacement was less for IUHS (3.9 µm vs. 4.9 µm $\pm$ 0.3, P = 0.018), and curvilinear velocity was slower for IUHS (84 µms-1 vs. 103 µms-1 $\pm$ 5.7, P = 0.045) compared to IUTN. In summary, IUHS had decreased sperm production, diminished sperm quality, and delayed testicular growth during puberty, indicating the negative repercussions on boar reproduction.

Life Science

Poster Number 42: Jay Qiu

The DNA methylation landscape in blood samples of hepatocellular carcinoma patients

Late onset of hepatocellular carcinoma (HCC) accounts for late diagnosis and poor prognosis. It is estimated that HCC early detection would increase the cure rate from 5% to 80%. Thus, identifying new effective tools with reliable and quantifiable biomarkers is of high interest. Aberrations in the DNA methylation patterns have been shown to differentiate HCC tumors from normal tissues. However, these changes as diagnostic markers would have a high application in clinics only if detectable by minimally invasive tests like a blood test.

In the present study, we performed a comprehensive evaluation of DNA methylation profiles in blood DNA collected from 24 HCC patients who provided samples after diagnosis (post-diagnostic cases) and from 24 healthy controls, enrolled by the Indiana Biobank. We used Human Methylation 450K BeadChip array for genome-wide DNA methylation analysis and pyrosequencing for validation of DNA methylation differences.

We identified 7,047 CpG sites differentially methylated between cases and controls with $p \leq 0.05$ and intraclass correlation coefficient (ICC)≥ 0.5. One of the strongest differences (probes) was detected within LYNX1 enhancer (difference=0.28, ICC=0.99) and was technically validated using pyrosequencing. Furthermore, we verified and confirmed those changes in blood samples collected from 21 patients at the time when they were clinically considered cancer free (pre-diagnostic cases) and developed HCC within 4 years of follow-up. Those patients were matched with 21 healthy controls.

Our present study establishes for the first time differences in DNA methylation at specific CpGs that are detectable in blood of individuals both before and after conventional diagnosis with HCC. The identified probes have high potential to be developed into early detection HCC biomarkers once validated in a larger cohort of individuals at risk.

This research was supported by the ACS Institutional Research Grant and Showalter Trust Award granted to BS.

Life Science

Poster Number 43: Yichen Que

Evaluation of the Impact of Errors in the Sorting of Pigs for Market on Sort Loss at a Range of Marketing Ages

The BW growth curves for 25, 4000-head finishing barns were simulated to: 1) evaluate the impact of sorting errors on sort loss at different mean carcass weights (CW), and 2) demonstrate that the magnitude of sort loss due to inaccurate sorting is affected by the pigs' mean CW. Two types of errors were evaluated, BW estimation error (BWEE) and percentage of pigs not visually evaluated (PNVE). Pigs are not evaluated when the targeted number of pigs are identified and sorting stops with heavier pigs than those sorted not being evaluated. Four levels of BWEE with SD's of 0, 4, 6 and 8% of BW and 4 levels of PNVE (0, 8,

16, and 24%) were simulated. Sort loss was calculated using a market value system for a U.S. pork processor (IPC, Delphi, IN). Pigs were initially marketed in 3 marketing cuts, 25% at 169, 25% at 179 and remaining 50% at 193 d of age. Marketing ages for the pigs were shifted in weekly intervals with mean ages of 155.5, 162.5, 169.5, 176.5, 183.5, 190.5, 197.5, 204.5 and 211.5 d of age. Two variables: number of pigs with sort loss and mean sort loss per pig in the barn were fitted to a model including the fixed effects of level of marketing age (AGE), BWEE, PNVE, their interactions and random effect of replicate barn using the MIXED procedure of SASÂ®. The main effects of AGE, BWEE, and PNVE, and AGE x PNVE, AGE x BWEE, and AGE x BWEE x PNVE interactions impacted both variables (P < 0.001). The effects of BWEE and interaction of BWEE x PNVE impacted (P < 0.001) both variables at all ages. The difference in sort loss/pig produced by the least accurate sorting (BWEE = 8% and PNVE = 24%) increased as the mean CW increased from $1.00 at 93 kg to $4.53 at 103 kg. Sort loss/pig increased more rapidly with increased CW at higher levels of BWEE and PNVE. The effect of inaccurate sorting to increase sort loss is minimized when the mean CW is close to the middle of the pork processorâ€™s acceptable CW range and increases as CW increases to those approaching the uppe

Life Science

Poster Number 44: Emmy Rawson, Mahima Grover, Juya Jeon

Genomic Sequences of Bacteriophage Analysis

Bacteriophages are parasitic viruses that target bacteria. Previous semesters have isolated bacteriophages from soil samples using Mycobacterium smegmatis as the host bacteria. The bacteriophage was analyzed through the following methods: electron microscopy, isolation of DNA, and sequencing of phage genomes. The isolated phage were sequenced at Purdue sequencing center. This research focuses on analyzing the genetic code of a unique phage in order to determine potential genes and their function. Programs used in this research are DNA Master, Phamerator, and GeneMark. DNA Master is a comprehensive software that has the capability to automate a genome sequence and provide an output of similar genes in the same family. Phamerator is a comparative tool that allows the user to note similarities between different genomes. This tool is useful because genomes in the same family may have similar gene start positions. GeneMark provides a map of a genome that displays the various coding potential in six frames. JewelBug is a bacteriophage that isolated using Mycobacterium smegmatis as the host bacteria and belongs in the A6 family. This information was used when compiling the Phamerator and GeneMark map.

The DNAMaster program was used to annotate each gene sequence through computer automated software. Through using Pharmerator and Genemark, students looked at each genome sequence called in DNAMaster and compare it with the other tools. Based upon the evidence gathered, a final annotation of each gene is compiled with evidence from all three tools. Start codon, functional analysis, and comparative investigation of previously sequenced

phages on JewelBug have been completed. Next steps in research would include analysis of additional bacteriophage for comparative analysis between bacteriophages.

Life Science

Poster Number 46: Kristen Sequeira, Mekenzie Gear, Rachel Makowski, Mary Kate Harrod

Phage-based Reduction of Listeria Contamination on Non-food Contact Surfaces

Infections with Listeria monocytogenes are often associated with the consumption of contaminated processed or deli meats. People who contract Listeriosis usually go to the hospital and one in five will die from the infection. Here we measured the efficacy of a commercial Listeria phage product in reducing contamination of non-food contact surfaces (NFCS) common in retail establishments. Stainless steel coupons were inoculated with CFU of Listeria monocytogenes (LM94). Each stainless steel coupon was then treated with either: 1) PFU listeria phages; or 2) PBS (control). All stainless steel coupons were incubated at 21Â°C for 18hr. Following incubation, Listeria concentrations were measured in each stainless steel coupon by serial dilution and plating on LM+MOPS agar. Each treatment contained 12 stainless steel coupons and was repeated in triplicate (36 samples per treatment). Final concentrations of Listeria on phage treated coupons (ave. 1.37 log10 CFU/mL rinsate) were reduced over 4 logs compared to untreated stainless steel coupons (ave. 5.46 log10 CFU/mL rinsate). Thus, phage treatment reduced Listeria contamination of NFCS by over 99.99%. These results indicate that phage-based treatments hold great potential in reducing Listeria contamination of NFCS and, in turn, cases of foodborne Listeriosis. Further studies will focus on determining the efficacy of the treatment in more production-like settings and, if successful, retail establishments.

Life Science

Poster Number 47: Alex Smith, Matthew Rodibaugh, Matt Muskat, Evan Martin

AFIS Genome 16900 - 25000 BP

Bacteriophage are one of the most abundant and diverse organisms on our planet. They represent the largest sink of genetic information and are vastly unexplored. To better understand bacteriophage, these organisms are collected, isolated, purified, characterized, and analyzed in a wet lab setting to obtain their DNA. In 2014 the phage AFIS, found in West Lafayette, Indiana, went through these procedures and was cataloged in the phage database. Until this project, the genome of AFIS was only a collection of amino acids without annotated functions or verified genes. To further scientific understanding of bacteriophage and their potential uses, it was necessary to annotate the genome of this phage. This annotation of the AFIS genome (base pairs 16900 - 25000) was carried out using a myriad of tools: Phamerator maps (for genome comparison to sequenced phages), DNA Master algorithmic predictions for

genome annotation, and Gene Mark coding potential charts for open reading frames. These tools were used to verify the predictions of other tools and support the existence and details of genes within the region of the genome under scrutiny. AFIS genome annotation included calling eight predicted genes and determining their functions within the studied section of the genome. AFIS was observed to have a highly conserved set of genes and functions with phages in the A1 cluster. The findings in this project will be submitted to a master file wherein all parts of the AFIS genome will be compiled to have a complete annotation of the genome.

Life Science

Poster Number 48: Rebecca Smith, Beenah Shokouhzadeh

It's no laughing matter: cage color and light intensity alter rat affect

Rats find high intensity light aversive so some laboratories use red plastics that reduce light intensity and change light spectrum. However, the effects of red plastics on rat behavior and well-being are not known. Rat behavior and well-being can be improved by tickling, which is a human-animal interaction which mimics rough-and-tumble play. During tickling, rats produce ultrasonic vocalizations (USVs) in the 50-kHz range which indicate positive affect. We hypothesized that altering the caging environment by manipulating the light spectrum and intensity would alter the positive affective state measured through tickling.
Male and female rats of two strains (albino CD and pigmented Long-Evans (LE)) were housed in four different cage types: red 200 lux, red 25 lux, clear 200 lux, and clear 25 lux. We tickled rats for 7 days after weaning. During tickling, we recorded ultrasonic vocalizations that were later coded by observers blind to treatment.
Results showed that in red cages, rats produced more 50-kHz vocalizations at 200 lux than 25 lux. In red cages, more 50-kHz vocalizations were produced by CD rats than LE rats. In clear cages, more 50-kHz vocalizations were produced by LE rats than CD rats. CD rats raised produced more 50-kHz calls in the 200 lux environment than those in the 25 lux.
In conclusion, interactions between strain, light intensity, and light spectrum impact rat positive affect as measured by tickling.

Life Science

Poster Number 49: Abigail Sommer

Assessing the Survival of Human Pathogens in Commercial Fruit Wines

Wine has historically been considered microbiologically safe for human consumption due to several different factors including the high organic acid content, high ethanol concentration, added sulfur dioxide and polyphenolic compounds. Fruit wines generally have a higher pH, and lower alcohol concentration than traditional grape wines. Due to this difference and the recent emergence of acid resistant strains of pathogens, the possibility that pathogens could survive in

certain wines such as fruit wines is higher than ever. The goal of this study is to examine the effect of acid concentration and alcohol content on the survival of Listeria monocytogenes and E.coli 0157:H7 in fruit wines. E. coli and Listeria monocytogenes were used to inoculate ten different wine samples after being adapted to an acidic environment. While the organisms did not survive after three days in the wine samples and sometimes did not even survive long enough to be plated, characteristics that are more likely to allow for survival were identified. As the pH increased, both pathogens were more likely to survive the initial inoculation and same-day plating. As ethanol concentration increased, both organisms were less likely to survive initial inoculation and plating. While, the individual correlation coefficients for these trends are very low, combining the impact of multiple factors could result in a model that could provide a better risk assessment for commercial wines.

Life Science

Poster Number 51: Alyssa West, Caitlinn Lineback

Disinfectant Performance Curves for Antibiotic- and Multi-Drug Resistant Pathogens

Antibiotic- and multi-drug resistant (MDR) pathogens are an increasing concern in health-care settings. Current data on antibiotic resistance correlations with disinfectant resistance or tolerance is conflicting. The objective of this study was to examine the effect of disinfectant concentration and contact time on bactericidal efficacy of accelerated hydrogen peroxide and quaternary ammonium compounds. We hypothesized that antibiotic resistance does not increase tolerance or resistance to disinfectants at defined use concentrations. Research was conducted on stainless steel discs using EPA standard operating procedure MB-25-02. The bacterial strains tested in this study included four MRSA strains (MRSA 17, 20, 54, and 61) and one standard control Staphylococcus aureus strain. Efficacy was measured at label concentration, four contact times (30 sec, 1 min, 2 min, and 3 min) and at three concentrations (1X, 0.75X, and 0.5X of label concentration) with a constant contact time. Results showed that there was a significant difference between the control strain and MRSA 17 (ATCC BAA-1717) with varying contact time (p<0.0001) and with varying disinfectant concentration (p=0.0011). MRSA 17 is classified as PFGE type USA 300 and is linked to community-associated MRSA infections. These results suggest that certain MDR S. aureus strains may have an increased tolerance for certain disinfectants.

Poster Number 53: Tiffany Wineinger, Amara Erickson

Tickling dosage investigations: do frequency and duration matter?

Introduction: Laboratory rats find initial interactions with humans stressful. Tickling, a human-animal interaction that mimics rough-and-tumble play, can help improve rat welfare. Previous protocols for rat-tickling are time intensive. Our purpose was to identify the most time-efficient combination of rat tickling frequency and duration that still allows for improvement or rat affect and ease of handling for the researchers. We hypothesized that five minutes or less of tickling will significantly improve rat affect and handling.
Methods: We sampled 36 rats of both sexes housed in pairs. Rats were randomly assigned a combination of treatment duration (15, 30, or 60 seconds/rat) and frequency (1, 2, or 5 days). On the final day of tickling rats received an intraperitoneal saline injection. We tested rats daily for their anticipatory and reactionary responses via human approach tests before and after tickling and injection. Rat vocalizations were recorded during all sessions and is still being coded. We analyzed data using one-way ANOVA.
Results: Latency to approach in anticipatory and reactionary approach tests were not affected by either frequency or duration of tickling or when comparing tickling versus injection days.
Discussion: Tickling rats, even for short amounts of time, may improve positive affect in a laboratory setting or during an aversive procedure based on approach data. However, vocalization data may give more insight into the amount of tickling needed to achieve improvements in positive affect.

Life Science

Poster Number 54: Songhao Wu

Improvement of Lipid Extraction in Algal Biodiesel Production with Sonication

Biodiesel has been considered as a potential alternative biofuel for fossil fuel. However, low efficiency of lipid extraction from algal cells has contributed to biodiesel's high production cost. Previous studies show that pyrolysis, microwave, surfactant, and sonication can improve the efficiency of lipid extraction, but conditions for maximizing lipid extraction from algal cells have not been fully investigated. In this study, we evaluated lipid extraction of Chlorella sp. (ATCC® 50258™) with sonication. The biomass of cultured cells was harvested by centrifugation. The total lipid amount was determined gravimetrically by 1:1 chloroform–methanol extraction. The lipid containing supernatant was collected through centrifugation after sonication. And the lipid was extracted from the supernatant via chloroform-methanol method and determined gravimetrically. The results indicated that lipid extraction from algae was significantly improved with sonication. Sonication avoids the usage of

large amount of chemicals used for chemical extraction and minimizes environmental impacts of algal biofuels. In the future, the optimized sonication extraction conditions such as sonication power, sonication time, as well as water content will be further investigated.

Life Science

Poster Number 55: Bofan Xie

Bourse length differentiation and floral induction of four apple cultivars

Irregular flowering may lead to inconsistent cropping (biennial bearing) of apple which is a significant economic challenge for the apple industry. Factors that affect flower induction in bourse buds are critically important for consistent production of apples. To further understand the factors that can exacerbate biennial bearing, this study was conducted to determine the optimum bourse length for flower induction in four apple cultivars. We randomly tagged 500 flower clusters on each of four cultivars at the time of full bloom. Half of the flowering spurs were de-fruited completely and the other half of the flowering spurs were thinned to a single king flower. Bourse lengths of two biennial bearing cultivars (Honeycrisp and Golden Delicious) and two regular bearing cultivars (Gala and GoldRush) were measured throughout the growing season. Flower initiation was measured at the end of the growing season.
A wide range of bourse length distribution was measured among the four apple cultivars. Honeycrisp and Gala had the highest return bloom on bourse buds 0.5 - 2.0 cm long. Golden Delicious had the most return bloom distributed on bourses 1.1-1.5 cm long while Gold Rush had most return bloom distributed on bourses 1.1 â€" 2.5 cm in length. Among the 4 apple cultivars, Gala had the highest return bloom while Honeycrisp had the least amount of return bloom. Golden Delicious and GoldRush were intermediate in their level of return bloom

Life Science

Poster Number 56: Luping Xu

Interaction of Listeria monocytogenes and Staphylococcus aureus in multispecies biofilm formation

Listeria monocytogenes and Staphylococcus aureus are human pathogens causing life-threatening infection through food or wounds. Both pathogens are responsible for mastitis in cow and are transmitted through milk. Although the molecular mechanism of pathogenicity is well understood, the knowledge of the pathogens behavior and their pathogenic attributes during biofilm formation are poorly studied. Listeria spp. may coexist with staphylococci; therefore, our objective is to understand their interaction during biofilm formation. Biofilm forming capability of ten S. aureus and two L. monocytogenes strains were assessed using crystal violet staining method. S. aureus cultures were analyzed for the presence of virulence genes: hla, hlb, sea, seb, sec, bap, icaA, icaDï¼Œusing PCR. Two strong biofilm-forming S. aureus strains were used for co-culture with Listeria.

L. monocytogenes and S. aureus were mixed at different ratios to form biofilm on plastic plates. The detached cells from biofilms were plated on selective medium (Mannitol salt agar and Modified Oxford medium) for enumeration. Each strain was tested for resistance/sensitivity to a panel of antibiotics (gentamycin, erythromycin, ampicillin). The results show that the amount of viable cells from L. monocytogenes F4244, a weak biofilm former, has increased when co-cultured with S. aureus 10832, a strong biofilm former. Meanwhile, the viable cell counts of S. aureus 10832 in the biofilm decreased compared to the monoculture biofilm. The inhibitory effect was also proved to be dose dependent. As the initial L. monocytogenes count decreases, the viable S. aureus count recovers. Antibiotic resistance/sensitivity tests showed that resistance to antibiotics did not change significantly after co-existence in biofilm. These results suggest a complex interaction dynamics exist between two pathogens during biofilm formation, which requires further investigation on their inhibitory mechanism, gene regulation and pathogenicity.

Physical Science

Poster Number 36: Osamudiamen Ogbeifun

Effects of Probiotics Feeding Levels on Meat Quality and Lipid Oxidation Stability of Breast Muscles from Heat Stressed Broilers.

Heat stress negatively affects meat quality attributes including oxidation stability. Since microbial probiotics supplementation results in positive impacts on growth performance and antioxidant property, it could be hypothesized that supplementation can improve meat quality attributes of broilers exposed to heat stress. The objective of this study was to determine the effects of probiotics levels on meat quality and oxidation stability of heat-stressed broilers. Three hundred and thirty-six 1-day-old chicks were group-weighed and randomly assigned to 18 pens with three different diets (basal plus 0, 0.5, and 1.0 g of PoultryStar [$1.0\tilde{A}—105$ cfu/g of feed containing 4 strains of bacteria]). Heat stress began at 8 days up to 42 day at 32 ºC for 12 hr/day. At 42 day, two birds were randomly selected from each pen and harvested. Breast muscles were removed from carcasses at 24 hr postmortem. Measurements for cook loss, shear force, color, proximate analysis, peroxide value, 2-thiobarbituric reactive substances, and phospholipid content were conducted. Probiotics feeding did not affect shear force, cook loss, or color ($P>0.05$). An increase in probiotic feeding level slightly decreased fat and ash contents of broiler breast muscles ($P>0.05$). In terms of lipid oxidation stability, an increase in probiotic levels led to a significant increase in peroxide values ($P<0.05$), whereas TBARS of breasts from broilers fed probiotic were lower than that of control broilers ($P>0.05$). The results of the current study showed feeding probiotics to heat-stressed broilers could decrease fat content of broiler breasts and possibly inhibit formation of secondary lipid oxidation products.

Physical Science

Poster Number 45: Ryan Schroeder

Utilizing GIS to Locate Endangered Gravel Hill Prairies of the Wabash River Valley

The Gravel Hill Prairies (GHPâ€™s) of the Wabash River Valley are an endangered ecosystem in the state of Indiana and provide optimal growing conditions for a number of state endangered plants. Currently only four remnants are known to exist near Lafayette, IN, found by a previous study conducted in 1980 by Post, Bacone, and Aldrich (Proceedings of the Indiana Academy of Science, 1984, vol. 94: 457-464). These unique ecosystems have been found to occur almost exclusively on soils classified as Rodman Gravelly Loams and Strawn-Rodman complexes which occur predominantly along the outwash terraces of the Wabash River and its tributaries. Seven Indiana-state endangered plant species, more typical of western shortgrass prairies, are documented on these soils. This research effort aimed to develop GIS maps to scout for and discover areas of unknown GHP remnants. The end goal of the project is to assist conservation groups in the development of a strategy to preserve previously undiscovered remnants. This project relied on spatial analyses with Geographic Information Systems (GIS) and numerous databases including the USDAâ€™s gridded Soil Survey Geographic (gSSURGO), which had not been used previously to develop maps and scouting plans. Analysis have identified a total of 972 areas of interest, of which 53 have been visited and had preliminary plant lists put together. These field scouting trips have found five fragments of gravel hill prairie remnants along the Wea Creek and the Wildcat Creek in Tippecanoe Co., one remnant fragment along Bee Run in Warren Co., and numerous high quality open-oak woodlands. These fragments are at varying stages of plant community degradation, however, one of the fragments along the Wea Creek contains the state endangered aromatic aster (Aster oblongifolius).

Social Science/Humanities

Poster Number 11: Wesley Davis

Further Insights from the Purdue University 2015 Performance Management in Agribusiness Survey

I am studying the role and perception of human relations (HR) and performance management (PM) activities in U.S. food and agribusiness firms. Both HR management tactics and PM activities will be analyzed in terms of their variance and relationship among different firm categories and employee categories. While the study is ongoing, the research will be concluded and final analyses summarized by April 1st.
The purpose of this study is to understand performance management activities and employee perceptions of those activities in food and agribusiness firms. PM activities and employee perceptions will be analyzed by segmenting firms using categorical characteristics. Additionally,

employee perceptions will be further analyzed using ordinal and categorical variables describing the employee. For the survey used in this study, each participant was asked to report information on themselves as well as the firm. This will allow us to analyze potential relationships between employee and firm data, as well as PM activities and employee perception of the activities.

This study will complement existing research as well as examine potential relationships between performance management techniques and firm-level and employee-level characteristics. The findings yielded would provide several potential insights. First, the results will help to create a roadmap for future research by presenting topics needing further investigation to fully understand performance management in food and agribusiness firms. Second, the results will add clarity to the potential relationships between firm-level and employee-level characteristics and performance management techniques. Finally, the results will help to further clarify how food and agribusiness leaders can best optimize and utilize human capital in their business to establish a strategic advantage.

Social Science/Humanities

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Social Science/Humanities

Poster Number 30: Gayatri Mazgaonkar

Effects of Animal-Assisted Activities on Positive Emotional Display in Children in Inclusion Classrooms

Animals are commonly present in classrooms, and may be an important tool in enhancing children's experiences, especially in inclusion classrooms, which include both typically-developing (TD) children and children with special needs.

The purpose of this study was to investigate the impact of Animal-Assisted Activities on children with Autism Spectrum Disorder (ASD) as well was typically developing children (TD) in inclusion classrooms.

Ninety-nine children from fifteen inclusion classrooms were divided into groups of three (two typically-developing children and one child with ASD) to take part in free-play sessions with either two guinea pigs or a set of toys. These sessions were videotaped and the children's behavior was coded. Behavior coding was done based on interaction and emotional display, either positive (smiling, laughing) or negative (frowning). Triggers for positive behaviors were classified into three categories â€" social interaction, animal interaction and observation of animals or peers.

Both typically-developing children and children with ASD showed increased smiling overall positive emotional display in the presence of animals compared to toys, but typically-developing children laughed more during the toy sessions, while children with ASD laughed more in the animal sessions. Further examination of laughter triggers revealed that typically-developing children laughed due to social interaction, while children with ASD laughed due to observation and animal interaction.

These results indicate that guinea pigs can positively enhance the experiences of children in inclusion classrooms, and encourage laughter in children with ASD. Future studies could further our knowledge by investigating similar impacts with other animals or examining the correlation between specific animal behaviors and laughter triggers.

Social Science/Humanities

Poster Number 32: Ryan Minter, Franklin Wagner

Growing Local: Exploring the Growth of Urban Gardens through Social and Physical Analysis.

Community gardens are a unique component of the urban environment that can present a number of benefits and challenges to the surrounding community. Grow Local, an organization in Lafayette, Indiana, has taken the initiative of creating a network of gardeners devoted to supporting and encouraging urban gardening through action, education, and organization,

ultimately enhancing community and quality of life. Researchers from Purdue University collaborated with Grow Local to perform a baseline analysis of the current community gardening projects in Lafayette. The goal of this study was to analyze the current gardening projects and to explore the possibilities for expansion, improvement, and future community involvement. Both quantitative and qualitative data collection methods were utilized throughout the research project. Garden inventories and yields were collected along with gardener and agency perceptions from interviews and focus groups. Soil samples were collected and analyzed to assess soil health. Soil analysis of physiochemical properties included soil pH, organic matter, micronutrient and macronutrients, soil texture, and heavy metals. Together, this information is useful in providing guidance to the Grow Local community as they manage and expand their urban garden footprint.

Social Science/Humanities

Poster Number 39: Jordan Paine

GMO Policy's Impact on United States Producers

There is a growing concern over the safety of genetically modified organisms (GMOs) risks, as well as the liability in regards to drift and GMO contamination. As the United States is one of the global leader's in the development and use of GMOs, the policies surrounding these products are crucial to United States farmers, as well as the United States agricultural industry as a whole. This research is a comprehensive study on how GMO policies affect the producers in the United States. It addresses the benefits and concerns with GMOs and the political framework surrounding them. Corn and soybeans are the focus, as they are the top GMO commodity crops produced and exported. For these reasons, political framework from the major countries, which the United States exports grains to, are analyzed alongside the United States GMO policies. The research takes into account perspectives from GMO producers, extension agents, corporations (including Monsanto, Syngenta, and Pioneer), and non-GMO/organic producers. The goal of this research is to identify issues within the current political climate and develop potential policy solutions to those issues.

College of Engineering

Social Science/Humanities

Poster Number 52: Mikaela Wieland

Consumer Perceptions of Cosmetically Blemished Produce

For a growing world population expected to approach 10 billion people by mid-century, food insecurity is one of the major global challenges facing humanity. An obvious step in addressing food security is limiting the amount of food that is wasted. Recoverable food waste is a growing problem in the developed world, where one-third of the food that is grown goes to waste. One source of food waste in America involves cosmetically blemished produce or â€œugly fruit.â€ This produce is frequently rejected by supermarkets on the basis of U.S. Department of Agriculture standards. This study investigated consumer perceptions of blemished produce using Purdue University students as the study population. A qualitative research design was employed using the Theory of Planned Behavior as the theoretical model to guide three focus groups addressing studentsâ€™ food behaviors and perceptions of blemished produce. Study findings revealed that participants are aware of food waste as a social issue and in fact often overestimate how much food is wasted nationally. Participants notice that cosmetically blemished produce is flawed and indicated they would be less likely to purchase it in grocery stores if given the chance to buy more attractive produce. However, participants indicated a general willingness to purchase blemished produce if assured it was of comparable quality and taste and sold at a discount. A recurrent theme involved the suggestion to avoid food waste by more systematically incorporating blemished produce into food donation systems and food bank networks. Findings are discussed in terms of improving public education about food waste, including possible industry alternatives to recover a greater proportion of cosmetically blemished produce for human consumption.

Innovative Technology/Entrepreneurship/Design

Poster Number 59: Sharifah Binti Syed Omar

Large-scale Research on Engineering Design in Secondary Classrooms with Big Learner Data Using Energy3D Computer-Aided Design

Through a five-year collaborative project, Purdue University and the Concord Consortium are applying a data-intensive approach to study one of the most fundamental research topics in learning sciences and engineering education: â€œHow do secondary students learn and apply

science concepts in engineering design processes?â€ We have collected data from over 1,000 middle and high school students in Indiana and Massachusetts through automatic, unobtrusive logging of student design processes enabled by a unique CAD tool called Energy3d that supports the design of energy-efficient buildings using earth science, physical science, and engineering science concepts and principles of design. Data includes fine-grained information of student design actions, experimentation behaviors, electronic student reflection notes, and virtual design artifacts. These process data are used to reconstruct the entire learning trajectory of each individual student. Our research evaluates how these learning analytics applied to these process data can be the computational counterparts of traditional performance assessment methods. Combining these process data with pre/post-tests and demographic data, we have investigated the common patterns of student design behaviors and how they are associated with learning outcomes with a specific focus on how students deepen their understanding of science concepts involved in engineering design projects and how often and deeply students use scientific experimentation to make a design choice.

Innovative Technology/Entrepreneurship/Design

Poster Number 62: Yongbum Cho

Cyber-security detection of fault data injection

Abstract - Increase in application of mobile robots and the annual growth of robotics industry, cyber security is essential for robot system to ensure the security of human daily life. Cyber-attacks such as fault data injection (FDI) or data scoping critically affects the safety of robot systems especially for those which requires continuous supervision or the monitoring of the system operation. As an example, failure to prevent attacks such as (FDI) attacks for autonomous vehicle operation may result in severe death related road accidents. In this research, an algorithm combining the extended Karman filter and the model-based cumulative sum detection algorithm to detect the FDI attack is introduced. Validation of the proposed detection algorithm is tested through ROS (Robot Operating System) -Gazebo simulator using actual GPS data obtained from a pioneer 3-AT robot. A future development of this research is to test the algorithm on an actual pioneer 3-AT robot and extend its application to wider systems such as autonomous vehicles.

Innovative Technology/Entrepreneurship/Design

Poster Number 71: Abigail Hancock

Physical Representation of Hypertension's Effects on the Heart

Physical Representation of Hypertension's Effects on the Heart
Abstract
The purpose of this project is to educate people on the dangers of hypertension, or high blood pressure, focusing on the importance of taking high blood pressure medications and/or living a healthy lifestyle. This was accomplished through an assessment of the effectiveness of a novel blood pressure education device in instructing individuals on hypertension and its impact on health.

Three iterations of the device were designed to include both physical and visual stimuli. A hand pump is squeezed to propel fluid through tubes with two settings, one simulating pressure felt by a healthy heart and the second, an unhealthy heart unaided by medication. Lights were programmed to glow in reaction to the pressure using an arduino kit.

Education was conducted at health screenings where participants filled out a pre-survey of demographic information and questions regarding knowledge of hypertension. Randomized participants received a consistent education regarding hypertension, effects of the disease, and preventative measures, accompanied by the device demonstration, or without. The participants continued on to a health screening by the Purdue Pharmacy school which included testing of: cholesterol, blood pressure, and blood glucose levels. After this process, which takes approximately ten minutes, the participants took the post-survey to test their retention of the high blood pressure information.

Statistical results indicate a much higher percentage of participants retained specific knowledge regarding hypertension when educated with the device than those who were not exposed to the device. This provides evidence that this novel education device helps patients understand high blood pressure.

Innovative Technology/Entrepreneurship/Design

Poster Number 73: Margaret Hegwood, Michael Stepanovic, Holly Maize, Celine Chang, Sabeen Nadi

Quality Medicine Testing of SSFFC Medicines in Tanzania

SSFFC medication is a major concern in countries around the world, especially in the developing world. Forged and substandard medications pose major threats to their citizen's well-being and their economic status. This research focuses on designing an educational module and laboratory exercise that will teach students how to detect SSFFC medications with a "universal" method using High Performance Liquid Chromatography (HPLC). This research is also focused on the implementation of this module at the Kilimanjaro School of Pharmacy

(KSP) located in Tanzania. Acetaminophen tablets from four countries were purchased in Tanzania and tested at Purdue and KSP yielding an adequate sample of HPLC data to establish the purity of the drug product. Utilizing the approach developed here additional medications can be analyzed the information used to combat concerns about SSFFC medication in in Tanzania and throughout the developing world.

Innovative Technology/Entrepreneurship/Design

Poster Number 76: Xuerui Hu, Nilankan Chaudhuri

Wearable Sensor in Healthcare

Animals scientists are fascinated to gain deeper understandings of animal and human biological behaviors due to interaction through scientific measures. Pre-existing devices in consumer market and research field already provide physical activity tracking, a technology to measure human and animal interactive behaviors has yet to be developed. Thus, in order to further study behavioral patterns due to interactions in between humans and with animal, there is a need for technological advancement to address such a task. The goal of this project is to develop wearable proximity sensor devices with minimum functionality of detection and distance measurement among active objects applicable in healthcare environment. Arduino compatible prototypes are under development for testing accuracy, stability and usability. Current versions of the prototypes use two different sensor technologies: Ultra Wide-band (UWB) and Ultra High Frequency radio frequency identification system (RFID). The UWB device transmits and receives radio signals and utilizes a modified time-of-flight algorithm to obtain precise distance information for mid to long range mobile objects and potentially serves as the foundation for data exchange. The UHF device consist of a series of modules each transmitting up to a unique communication range to approximately locate distance of the compatible receiver.
Further development and release of a functional and reliable prototypes will supply contactless communication and distance measurement between multiple devices for data-processing and analysis of human-human and human-animal interactions within a certain vicinity. The prototype devices are expected to soon be tested on pets and their owners for preliminary data gathering and design validation.

Innovative Technology/Entrepreneurship/Design

Poster Number 77: Katherine Lin

Bioadhesive Chitosan Hydrogel for Peripheral Nerve Repair

Anastomosis of severed peripheral nerves remains a grand clinical challenge due to lack of optimal coaptation agents that promote regeneration and functional recovery. Clinical solutions that achieve this end without inflammation, pathogenesis, and dehiscence have been elusive.

Chitosan-based bioadhesive hydrogels present a promising alternative to traditional sutures and fibrin glues due to their biocompatibility, resorbability, and mechanical stability in situ. Photo-cross-linkable azidobenzoic zwitterionic chitosan (Az-ZWC) was synthesized by conjugating 4-azidobenzoic acid with low molecular weight chitosan (LMW, 15 kDa) followed by the addition of acetic acid and succinic anhydride to achieve an anhydride to amine molar feed ratio of 0.7. This chitosan solution formed a hydrogel in an average 35 seconds under UV radiation with a characteristic swelling ratio of 230. Adhesive exposure to neural cell culture demonstrated that Az-ZWC is not only non-toxic in acute and chronic time frames, but also cell-protective. This preliminary study gave useful results that can be drawn upon for future research aimed at constructing viable clinical treatment protocols involving Az-ZWC bioadhesive hydrogels for neurorepair.

Innovative Technology/Entrepreneurship/Design

Poster Number 80: Caitlin Nelligan

Investigation of the Two Stage Agricultural Ditch and Its Impact on Nutrient Management at the Field Scale

Efficient use of fertilizer to maximize crop yield and minimize deleterious impacts to water quality is a key challenge for Midwest. The two stage agricultural ditch is a new water management practice that is being tested at Throckmorton Purdue Agricultural Center (TPAC). This management strategy takes less cropland out of production compared to other practices. The two stage ditch allows for reconnected floodplain soils to absorb more of the water and associated pollutants leaving the fields before they are transported downstream and impact drinking water supplies or harm ecosystems. During wet weather, the larger area of the channel allows the water to move slower and provide time for physical, biological and chemical retention of water, sediment and nutrients. My goal is to monitor and collect the sediment that is deposited in the floodplain benches. Using this data, I plan to analyze concentrations of nutrients, pesticides and other pollutants attached to the sediment and accumulating in the ditch. Because this site has been monitored since 2012, I will have access to stream flow and water quality data. I will use my collected data, ongoing monitoring data at TPAC and crop yield, and fertilizer application from the farm managers to create a nutrient balance. With the information gathered from my analyses I can find how truly effective the two stage ditch is for farmers, their crops, and the environment.

Innovative Technology/Entrepreneurship/Design

Poster Number 84: Mukul Sunil Sawant

Mechanical Chain Reactions and Prestressed Assemblies

The research aimed to conduct an analysis of mechanical chain reactions of prestressed assemblies. The assembly of wooden sticks (popsicles sticks) weaved together in the "cobra" style is the chosen structure to be the subject study for this research. The weave consisting of elastically preloaded sticks can carry mechanical loads through compression and tensions when triggered. The relationship to the sticks' geometry and speed is intended to be studied with the fundamental concepts of wave propagation, and then consider if such elastic energy storage systems could play a role as engineering structures (such as for energy storage systems).

Innovative Technology/Entrepreneurship/Design

Poster Number 85: Leah Schroeder

Drop-Based Printing of Thin Films with Low Dose Pharmaceuticals

In recent years, thin oral dissolving strips have been used in medicine for patients for whom swallowing pills may be difficult, including geriatric and juvenile patients. Traditional methods of creating films, including casting, often lead to uneven thickness and uneven distribution of the pharmaceutical in the film. As a result, the dose per unit area of each strip is not exact, and as such, it is difficult to ensure that patients are receiving the intended dose. Previous efforts have been made to create drop-based printed of pharmaceuticals in suspensions onto tablets or into capsules to provide customized dosing depending on patient needs. Efforts are being made to expand on these efforts and print the suspensions into films. This project seeks to determine if drop-based printing of films will improve issues generally associated with film production by controlling how drops are placed in the molds according to drop properties. Formulations of the suspensions of the films will also be tested to determine the best polymer base and appropriate concentrations for each component (polymer, flavoring, active ingredients, etc.) according to the final product's time required for disintegration, tensile strength, endurance, and changes in properties overtime.

Innovative Technology/Entrepreneurship/Design

Poster Number 87: Tianlong Sun, NamAnh Nguyen

Acetate production through microbial electrosynthesis via various pure culture acetogens

Renewable energy, particularly bioenergy, is becoming more popular as environmental and social issues arise with the rapid consumption of fossil fuels. Bioelectrochemical systems have provided an opportunity of renewable energy production and carbon utilization. Microbial electrosynthesis is a technique using electricity to reduce CO_2 to multi-carbon extracellular compounds. In this project, we studied microbial electrosynthesis with three different types of acetogenic bacteria applied to membrane-less and single-chamber reactors. Liquid and gaseous samples were collected from the reactor and the concentrations of acetate and CO_2 were

measured. We observed the amount of acetate produced from these three strains, Clostridium autoethanogenum, Clostridium leptum, and Sporomusa ovata, for 1 V overall potential, which were 0.111 mM, 0.268 mM, and 0.801 mM respectively in a period of 11 days. The performance of these three strains in the same given condition were compared to optimize strain selection for further experiments. Combination of acetogens and acetate-utilizing bacteria will be used to further produce higher carbon compounds, such as butanol, for efficient production of biofuels. This research generates new possibility in directly producing biofuels from CO_2 as the sole carbon source and electricity as the sole energy source without the expensive biomass extraction costs.

Innovative Technology/Entrepreneurship/Design

Poster Number 89: Rachel Troscinski

Real Time Mass Flux Monitoring in Continuous Oral Dose Manufacturing

Currently pharmaceutical tablets are produced in batch processes, however continuous manufacturing is an identified solution for consistent and profitable manufacturing with monitoring and control of real time product quality. Mass flow information in real time is critical to account for process disturbances. Currently loss-in-weight feeders regulate mass flow; however, this technique limits the process by only controlling the input flow. As solids flow downstream, the non-ideal properties of solids result in flow fluctuations that could disrupt the steady state of the system and result in poor product quality. The ability to measure and control the flow of solid particles in real time would drastically change the industry and push it forward into a continuous process.

The proposed technique for mass flow measurement is an X-Ray unit developed by Enurga Inc. that is non-invasive, independent of particle size, shape and moisture content. This technique has been used with a series of tests measuring powder and granule flow. Test samples contain mixtures of microcrystalline cellulose (MCC) or lactose as the excipient, with acetaminophen (APAP) at concentrations of 0, 10, and 25 wt% as the model API. Magnesium stearate (MgSt) is used as a lubricant at 0.5 wt% and silicon dioxide (SiO_2) is used as a glidant at 0.2 wt%. This machine uses X-rays to detect material presence and electrostatic charges picked up by the solid particles as they flow through a cylindrical pipe. Material presence is measured using Beer-Lambertsâ€™ Law and particle velocity is measured using cross-correlation velocimetry. A K-Tron loss-in-weight feeder is used to maintain a consistent flow rate for calibrating the mass flow sensor as well as evaluating the mass attenuation coefficient (a material parameter). Identification of the mass attenuation coefficient during calibration, along with its variance will enable use of the equipment as an in-line measurement technique for mass flow rate.

Innovative Technology/Entrepreneurship/Design

Poster Number 90: Ashley Van Wormer, Reis Lehman

Mathematics as a Gatekeeper to Engineering

Engineers encounter a variety of problems in professional practice, ranging from well-defined to ill-defined; closed-ended to open-ended; and context-independent to context-dependent. Preparing engineering students to be able to address these different types of problems means that we must provide educational experiences that provide students with opportunities to develop a variety of skills, strategies and "ways of thinking." However, in order to prepare students for problem-solving in professional practice, we must understand how they approach problem-solving as undergraduates. In the current study, 75 students ranging from entering (first-year) engineering students to graduating engineering students, as well as graduating mathematics and graduating design students, will participate in this verbal protocol analysis study. Data collection is still underway, but preliminary findings suggest that the students draw on different design and mathematics strategies, and that their processes vary based on their previous design and mathematics experiences.

Innovative Technology/Entrepreneurship/Design

Poster Number 92: Yichen Zhong

Fine-Grained Road Vehicular Emissions Analysis Using Vehicle Trajectory Data

This project uses vehicle trajectory data captured by GPS devices to study fine-grained road vehicular emissions. Data from the taxi fleet are used as a case study. Tracked 11,881 taxi fleet during March 2nd and 25th, 2009 in Beijing has been studied. This project aims to better quantify vehicular emissions on the road network, including greenhouse gasses and criteria pollutants. We specifically focus on studying CO, CO_2, NOx and Hydrocarbon. We used equation from CORPERT model to calculate the hot emission factors with parameters for each pollutant. In order to increase accuracy, our recorded data concerns resting time as well, each resting time will split the whole trip into small trips because the emission is negligible during the resting period. After that, we are able to study our trip emission factors and study its distribution. We also study the relationship between velocity and emission factors and compare it with the CORPERT model. This comparison can help us to learn how the real driving pattern will affect the estimation results of the model. Past studies are mainly relying on aggregated data. Being able to pin vehicular emissions to the road network can help identify emission hot spots and inform policies to reduce emissions. Vehicle trajectory data provided unprecedented opportunities to better quantify vehicular emissions both spatially and temporally.

Poster Number 63: Larkin Cooper, Caleigh Roleck, Dan Hoban, Travis Lantz

Genome Annotation of the 24,900 to 33,000 base pair range of the Mycobacteriophage AFIS

Bacteriophages are the most prolific organism on the planet, and yet their genetic diversity is little understood. Still, bacteriophage research is valuable, as bacteriophages can both increase the pathogenicity and virulence of their bacterial hosts or kill their bacterial hosts, which allows phage-based treatment of bacterial infections. While not all bacteriophage will be able to perform either of those medically-relevant functions, we hope that a better understanding of bacteriophage genetics will allow future researchers to be able to efficiently recognize bacteriophages with medically-relevant properties. After a novel bacteriophage was isolated from the soil and purified, we extracted its genome for the purposes of DNA sequencing. The genome of mycobacteriophage AFIS was then analyzed using a variety of bioinformatics tools to find open reading frames, analyze coding potential, compare DNA sequence similarity with that of other mycobacteriophages, and predict putative gene functions. We determined that, in the base pair range 24,900 to 33,000, AFIS's genome contains thirteen genes that are highly conserved among other mycobacteriophages belonging to the A1 subcluster. This aligns with previous bacteriophage research, which concludes that bacteriophage genomes are dense and efficient. Through the use of bioinformatic software, three putative genes were shown to have conserved domains relating to the functions of an integrase, a DNA polymerase, and a Î² lactamase, while the other genes encoded for hypothetical proteins with undeterminable functions. In future studies, we should experimentally confirm gene function, as current predictions are only putative, in order to verify our genome annotation and predictions.

Life Science

Poster Number 72: Anne Hays

Rain Garden Ecosystem Services

Rain gardens are a type of green infrastructure that provide many ecological and social benefits. Typical gray infrastructure lets stormwater flow along impervious pavement into a system of pipes and drains gathering pollutants along the way. Green infrastructure such as rain gardens allows stormwater to infiltrate into the ground reducing hydrologic impacts and improving water quality. Rain gardens provide additional ecosystem services including habitat, carbon storage, and beautification. The purpose of the study is to determine how location affects the ecosystem services a rain garden provides. Specifically, we are assessing the effect of visibility and accessibility as well as the use of adjacent spaces on ecosystem services, including plant diversity, water quality, and carbon storage. Three rain gardens in the Lafayette

and West Lafayette communities are being monitored for water quality, plant diversity, and carbon storage. Water quality of inflow to the rain garden is measured using first flush samplers and infiltrating water is captured using lysimeters. Plant diversity is determined by classifying plants into categories and heights. Location of rain gardens is classified by existing and adjacent land type, proximity to roads and walkways, and pedestrian traffic. This data will help relate rain garden location to the quality of ecosystem services it provides. Future research will be done to expand the study to determine the transferability of our results to other locations and at greater spatial scales.

Life Science

Poster Number 74: Christina Hendren

Capture of Cell Surface Glycoproteins

Cell surface proteins are frequently observed to be correlated with malignant growth. Shed and secreted forms of the proteins can be biomarkers for diseases like cancer. Surface proteins can also be studied for cross-linking with bacteria. Glycosylation is known to aid the development and progression of cancer, and a clear majority of accepted cancer biomarkers are glycoproteins. The identification of these glycoproteins can be used as a diagnostic tool. Identification is routinely performed using mass spectrometry, and to give the best data, a high number of glycoproteins should be captured with high specificity. The glycoproteins will be captured using hydrazide beads. This method will target the cell-surface expressed glycoproteins by using live cell surface labeling and affinity peptide enrichment. After a method of glycoprotein capture is created, a next step will be to quickly and inexpensively detect the glycoproteins that can indicate cancer or other diseases. In this way, the cell surface proteins can be used as biomarkers and provide a non-invasive early test for cancer. Experiments are still in progress.

Life Science

Poster Number 78: Xiangxing Long

Ecological Services of Urban Vegetation

Throughout this project, we calculate the ecosystem benefits of 9400 trees on Purdue campus. The benefits include carbon sequestration, stormwater interception, air quality benefit, energy benefit, and aesthetic value. I apply I-Tree Software developed by USDA, reformat the data retrieved from Purdue Arboretum Database and import them to I-Tree Street. With aid of I-Tree Street Software, I calculate the ecosystem services of urban vegetation in Purdue Campus, in

dollar value, which is useful to help us understand the important function and role of vegetation in urban area.

Life Science

Poster Number 81: Gloriia Novikova

Ultrasound beam steering of oxygen nanobubbles for enhanced bladder cancer therapy

New intravesical treatment approaches for bladder cancer are urged to be developed as currently approved treatments show several side effects and high tumor recurrence rate. This study used MB49 bladder cancer mouse model to evaluate cellulosic oxygen nanobubbles (ONB) as a novel agent for imaging and ultrasound guided drug delivery. In this study, we demonstrate that oxygen nanobubbles can be propelled and precisely guided to the tumor in vivo by an ultrasound Doppler Beam. Nanobubble velocity can be controlled by changing the ultrasound power, and nanobubbles can be aligned at desired angles by altering the angle of the ultrasound Doppler Beam. ONBs not only act as an excellent ultrasound contrast agent, but also possess tumor reoxygenating potential, that can reverse hypoxia through targeted delivery of oxygen. Precise ultrasound beam steering of oxygen nanobubbles was shown to enhance the efficacy of mitomycin-C (MMC), resulting in significantly lower tumor progression rates while halving the concentration of MMC. These results demonstrate the potential of oxygen nanobubbles drug encapsulated system to become the next realm in targeted drug delivery field due to its multimodal (imaging and oxygen delivery) and multifunctional (targeting and epigenetic programming) properties.

Life Science

Poster Number 83: Paige Rudin,Caleigh Roleck, Archana Kikla

Engineering E. coli for phosphate bioremediation with genes from polyphosphate-accumulating organism Microlunatus phosphovorus

Water phosphate concentrations greater than 25 µg/L are known to drive the growth of harmful algal blooms, which compromise water quality and cost global industry more than ten billion USD in damage annually, yet phosphorus is also a limited resource vital in agriculture. To improve phosphate management, we identified genes putatively responsible for phosphate uptake, storage, and preparation for exportation in the polyphosphate-accumulating organism (PAO) Microlunatus phosphovorus, transformed them into E. coli, and characterized their functions. Concurrently, we built a bioreactor and designed a suite of cost-effective phosphorus reclamation modules (PRMs) around xerogel-immobilized cells for contained, multipoint phosphate bioremediation. Xerogel beads are formed through a chemical reaction at room

temperature resulting in a porous glass matrix entrapping cells but allowing water, phosphates, and other nutrients to flow through. With continued testing, we expect to see an increased dry-mass percentage of phosphorus in our chassis relative to unmodified E. coli, elucidate cell viability and function within our glass beads, and understand the effective lifespan of our constructs. Through applied genetic, chemical, and mechanical engineering principles we expect to provide a means for preventing harmful algal blooms in both developed and developing countries while also recovering phosphorus for later agricultural use.

Life Science

Poster Number 86: Yiyu Shi

Impact of Microscope, Loupes, and Video Displays on Microsurgeonsâ€™ Risk for Musculoskeletal Injuries

Microsurgery is commonly performed with operating microscopes or loupes that constrains surgeon postures for prolonged periods of time and may increase their risk for musculoskeletal symptoms and fatigue. Heads-up video displays may improve surgeonsâ€™ postures by allowing microsurgeons to perform the procedure in a more comfortable and unrestricted position, but limited studies have compared user postures across these visualization tools. This study compares microscope, loupes and video displays on posture during microsurgical targeting task. Twelve participants completed a targeting tasks using the three displays, and videos of their sagittal planes were recorded and randomly sampled and postures were measured on each frame. Additionally, NASA-TLX was administered after each task to compare workload demands of each display. No significant difference ($p > 0.05$) was observed between 2D and 3D conditions for all displays. The ear-eye angle in video display was 20 and 37 degrees greater than microscope and loupes, respectively. And the neck flexion angle for video display was 13 and 25 degrees less than microscope and loupes. Workload did not differ significantly across displays, but trends indicate that video was more frustrating than loupes and microscope. Posture results indicate that video displays may allow participants a more upright and neutral head and neck angles than the other displays. However, video display may be more frustrating due unfamiliarity, limitations in the technology, or perhaps increased learning curve. Displays that reduces posture constraints have potential to improve ergonomics, and additional work is needed to improve user performance on these new technologies.

Life Science

Poster Number 88: Reed Trende, Erich Leazer, Eli Palm

Genome Annotation of Bacteriophage AFIS

Phage research is a rapidly developing field with a wide variety of potential applications, from treating bacterial infections to investigating evolutionary links between organisms. Much of the

research concerning phage revolves around annotating viral genomes, which involves locating and determining the function of genes therein. This paper outlines and discusses the processes, analysis, and critical decisions in genome annotation generally, as well as the specific case of the first 9000 base pairs of the bacteriophage AFIS. In doing so, this paper seeks to give readers a general outline of how to perform a genome annotation in the relatively simple viral genome. With genetics and gene editing techniques becoming more precise and more frequently used, a greater understanding of genomes of all types has led to the increased potential of a genetic breakthrough. Further, very little is known about viral genomes, as only about 3,000 of the estimated 1031 viruses on earth have had their genomes annotated, and far fewer have had these annotations verified in the wet lab (Poxleitner, 2016). As such, we have taken a sequenced viral genome and used DNA Master, Genemark, Phamerator, and HHpred to annotate the genome before uploading our results to the PhagesDB online database. As genomics is a rapidly expanding field of study whose advance is contingent on a growing database, we hope to contribute to its advancement.

Life Science

Poster Number 91: Hongji Zhang, Sharifah Binti Syed Omar, Terryn Sears, Britannia Horn

Functional Analysis and Annotation of JewelBug,a mycobacteriophage

A sub grouping of bacteriophages is known as mycobacteriophages, a type of virus, which exclusively infect mycobacteria. (Hatfull GF, 2012) For thorough research of a phageâ€™s genome, DNA annotation plays a significant role. Annotation can be done using gene prediction software which will generate a draft annotation of the genome. This auto annotation is reliable but often imperfect and can benefit from manual refinement. Therefore, manual annotation which includes designating appropriate start codon, deleting or adding new gene by gathering significant evidence, is necessary to guarantee the accuracy of annotation. DNA Master and Phamerator were used as the primary comparative analysis tools in calling genes, which used draft data sequence from databases like Glimmer. To aid in the process of making effective calls, a graphical analysis done by GeneMarkS was used as a reference for the open reading frame length. All of this gathered information was used to evaluate the preliminary annotation for a bacteriophage named JewelBug. The genome was annotated and the functions of each gene were examined. From the evaluation based on the guiding principles provided by SEAPhages, a finished annotation of the genome for the bacteriophage was created. This encapsulates the breadth of the genetic potential of the genome. Â Future work will include investigation on other features of JewelBug like its protein chemical and structural properties, predicted operons, gene ontologies, and metabolic pathways (Stothard & Wishard, 2006). This research plays a significant role in future phage research, as it will aid in characterizing and comparing phage genomes.

Mathematical/Computational Science

Poster Number 65: Yang Ding

Thermal-mechanical characterization of Li-ion batteries

Thermal run away has been a serious problem in the battery. This research intend to simulate the thermal effect on the mechanics and diffusion aspect of the cathode, which in this case is the NMC material. A COMSOL model is built to couple the thermal properties, diffusion rate and mechanics of the material. In addition, experimental measurement on the thermal conductivity of the NMC cathode is also conducted.

Mathematical/Computational Science

Poster Number 82: Neal Patel

Spatial-Stochastic Models of Calcium/Calmodulin Signaling Pathways Show Competition Serves as a Tuning Mechanism

The hippocampus is a region within the brain that is responsible for early memory formation and learning. These processes are largely attributed to the dynamic fluctuations that occur within the dendritic spines of these neurons. These fluctuations, termed synaptic plasticity, are influenced by calcium ($Ca2+$) signaling. $Ca2+$ has many targets, but the dominant target within the hippocampal dendritic spines is calmodulin (CaM), which serves as a $Ca2+$ sensor. CaM has been shown to bind to many downstream proteins which are crucial in synaptic plasticity. Many experimental studies have made great strides toward characterizing synaptic fate, but much of the specifics of these processes are unknown. In order to help elucidate the spatial and temporal dynamics, we created computational models of $Ca2+$, CaM, and $Ca2+$/CaM-dependent protein activation networks using stochastic and spatial-stochastic techniques. This was accomplished using Monte Carlo algorithms built into an open-source program MCell. Initial simulation results confirm a tuning effect in both the stochastic and spatial-stochastic models, indicating that downstream proteins are optimally activated at smaller ranges of frequencies of $Ca2+$ influx than is suggested by their isolated rate constants. Another key result is the apparent shift to lower frequencies which are able to induce optimal activation of certain players. These frequency shifts and narrowing effects provide further insight into the fine control that is involved in synaptic plasticity. Further work will incorporate more complex structural elements, particularly within the post-synaptic density, which are important in further characterizing spatial effects and protein localization.

Physical Science

Poster Number 57: Lena Abu-Ali

Evaluating the Bioavailability of Emerging Contaminants from Commercial Biosolids-Based Fertilizer

Use of commercial biosolids-based fertilizers is increasing in urban and suburban gardens, public and private green space, and agricultural systems as a valuable source of nutrients and organic matter. Recent studies, however, have shown that emerging contaminants, including pharmaceuticals and personal care products, are frequently found in biosolids. The land application of these biosolids may potentially increase the risk of transfer and accumulation of emerging contaminants in food crops. This raises concerns about the potential adverse effects on local ecology and human health. In this study, we conducted a kinetic experiment with biosolid-packed columns and a weak electrolyte solution to measure the desorption kinetics and the resulting concentration of selected emerging contaminants (triclosan, triclocarban, miconazole and carbamazepine) from commercial biosolids-based fertilizer. A biocide was added to the electrolyte solution to inhibit microbial degradation. The water phase was destructively collected at 1, 7, 14 and 28 days. Solid phase extraction was used to clean up samples prior to analysis. Surrogate and internal standards were added prior to analysis to account for extraction efficiency and matrix effects. All samples were analyzed using liquid chromatography-tandem mass spectrometry. This study should allow us to assess the potential bioavailability of emerging contaminants in commercial biosolids-applied soil.

Physical Science

Poster Number 58: Donald Alexander, Humberto Detrinidad

Effect of Energetic Crystal Proximity on Heat Generation in a Periodically Deforming Binder

Triads of octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) crystals were arranged as discrete inclusions within a transparent Sylgard 184 binder at specified distances. In order to isolate the proposed heat generation mechanisms of friction and viscoelastic heating at crystal/crystal and crystal/binder interfaces, a systematic study was conducted with some composite configurations containing touching inclusions, and some with slightly separated inclusions. Higher temperatures were observed for crystals embedded together and infer that this is due to friction between the HMX crystals. The increased temperature resulted in a phase transition within the HMX crystals increasing the sensitivity. This indicates crystal proximity and friction plays a role in hot spot formation within a Polymer Bonded Explosive.

Physical Science

Poster Number 60: Mallory Capestrain

Synthesis and Characterization of PAA-HEMA Polymer and Hydrogels

Copolymers can be created through many different polymerization techniques, and their compositon can be easily manipulated by changing the loadings of different monomers. The effect of changing the monomer ratio on composition of PAA-HEMA copolymers was explored through free radical polymerization and hydrogel reactions. Using the free radical technique, six polymers were made with amounts of HEMA monomer varying from 1-50%. GPC analysis displayed polymer molecular weight had dependence on the monomer ratio. The variation in copolymer composition when changing monomer ratio confirmed with FTIR analysis. The amount of HEMA in PAA-HEMA hydrogels was also varied. As the amount of HEMA increased so did the gel reaction time when compared to a pure PAA hydrogel. The mass of the hydrogel after swelling and drying were recorded. Further analysis of the hydrogels will include FTIR and DSC analysis. Future studies in polymer modifications will include the collection of zeta potential data of particles with attached polymers.

Physical Science

Poster Number 61: Neal Cardoza

Autogenic Synthesis of High Performance Carbon-Sulfur Cathode for Lithium Sulfur Batteries

There is an increasing demand for longer lasting and higher performance energy storage. Today's rechargeable lithium-ion batteries cannot meet the high-energy requirements for grid energy systems, longer-lasting electronics, and petroleum-free electric vehicles. In comparison, lithium-sulfur batteries far exceed the minimum requirements for these emerging technologies. However, technical challenges including low conductivity and the polysulfide shuttle mechanism, where the cathode decomposes into soluble chemical intermediates during cycling, inhibit battery lifetime to fewer than 10 cycles.
To address these issues, this work introduces the autogenic process to produce high conductivity, encapsulated carbon/sulfur composites. Developed in 2004 by Pol et al., the autogenic process enables temperature and pressure-based reactions within a solvent-free reactor. The autogenic process enables high sulfur loading (up to 75% by TGA) and improved efficiency of sulfur encapsulation in micropores (compared to traditional syntheses). Overall, autogenically derived carbon/sulfur composites improve electrochemical performance by increasing conductivity, due to increased interfacial contact between sulfur and carbon.

Physical Science

Poster Number 64: Cole Davis

Characterization of Suspension Polymerized Polyacrylamide and Poly(sodium acrylate-acrylamide) Copolymer

Shrinkage leading to cracking and mechanical instability is a major problem for concrete due to the loss of water during the curing process. However, through the addition of Superabsorbent Polymer (SAP) hydrogels, shrinkage can be prevented, increasing the strength of concrete. Characterization of suspension polymerized polyacrylamide (PAM) poly(sodium acrylate-polyacrylamide) (PANa-PAM) copolymer microsphere sizes, morphology and swelling behavior was conducted before adding them to concrete. Size was determined using microscopy paired with ImageJ analysis. Coulter Counter size characterization was also used to determine the particle size distribution. Swelling behavior was determined using the tea bag method as well as size analysis before and after hydration. After characterization, concrete containing various sizes of SAP microspheres will be tested for shrinkage and mechanical strength. These tests will allow us to discover the optimal size of SAP microspheres in concrete to increase its mechanical properties as well as control shrinkage. We will also investigate if the shape of particles has an impact on the final properties of the concrete. The results of this study will contribute to the growing knowledge of applying SAPs in concrete and will give a better understanding on how the size and shape of SAP hydrogels influence the properties of concrete. Using this knowledge, concrete can be made to perform better resulting in more mechanically sound structures.

Physical Science

Poster Number 68: Manjie Fu

Crawling-Induced Resuspension as a Major Source of Particulate Matter in the Infant Breathing Zone

Airborne particles of biological origin â€" bioaerosols â€" are present everywhere, including the indoor environment where people spend considerable amounts of time, and exposure to such materials via inhalation can have a number of health implications. Bioaerosol dynamics can occur through a variety of mechanisms, among them resuspension of deposited particles due to human activity. Because the breathing zone of infants is at a much lower height than that of adults, there is reason to suspect that infants are exposed to greater concentrations of bioaerosols resuspended from the floor, though knowledge in this specific area is limited. To investigate, a mechanical infant was used to simulate crawling over carpeting and particle concentrations for varying size groups were recorded using an optical particle sizer (OPS) at heights corresponding to both infant and adult breathing zones. In addition, resuspension tests

on the infant breathing zone were repeated following vacuuming of the carpets to observe the effect of vacuuming on exposure rates. Preliminary results show that, as a result of infant crawling, concentrations of resuspended particles are significantly higher in the infant breathing zone compared to the bulk air, which is reduced but not quite eliminated by vacuuming. This study demonstrates that infant crawling causes significant resuspension of particles in the infant breathing zone, making it a prominent contributor to infant bioaerosol exposure worthy of further investigation.

Physical Science

Poster Number 69: Philip Gordon

Metatectic Reactions in Fe-B Alloys

Automakers in the United States are currently pursuing automobiles with better fuel economy. To accommodate this, steel companies are developing boron steels which demonstrate higher strength over conventional automotive steel grades. This would mean thinner, and therefore lighter, boron steel components could be employed in lieu of incumbent steel components. However, in commercial production, steel companies have encountered issues in casting boron steels, as cracks form upon cooling. Phase diagrams predicted with Thermo-Calc software show that the iron-boron binary system undergoes a metatectic reaction of the form Î´â†'Î³+L at .01wt% Boron. Microstructures were observed of binary Fe-B systems and more complex commercial alloys. Cracking is observed to take place when solidified material contracts during cooling and material that has remelted does not. Solving the suspected issue of cracking upon remelting could lead to improved castability of boron-containing steels. The information gathered in this study could lead to target parameters for production of steels as well as an understanding of metatectic boron reactions in ferrous alloys.

Physical Science

Poster Number 70: Brenden Hamilton

Dependence of Hotspot Criticality on the Molecular Structure of RDX

Recent findings show that hotspots formed from the dynamical collapse of a pore are more reactive than thermally static ones of identical size and thermodynamic conditions. The increased reactivity of the dynamical hotspot can potentially be attributed to mechano-chemistry, non-equilibrium reactions or that dynamical hotspots are atomically disordered and, thus, possesses higher free energy and lower thermal conductivity than a perfect crystalline. We use molecular dynamics (MD) simulations with the reactive force field ReaxFF to characterize the criticality of nanoscale hotspots in the explosive RDX. Hotspots of various sizes

and temperatures were studied and followed in time evolution to determine conditions under which they transition to a deflagration wave. Preliminary results indicate that hotspots in amorphous RDX are more reactive and, for a given size, transition to a deflagration wave at lower temperatures, especially under high pressures created via shock. These exothermic reaction fronts burn through the material at a significantly faster rate in the amorphous system. We specifically analyze the possible origin of this increased reactivity in terms of thermal transport that tends to quench the hotspot. By employing a reverse non-equilibrium molecular dynamics (rNEMD) method to develop a thermal gradient, we derive numerical values for thermal conductivity of each system. This allows for the isolation of the atomically disordered hypothesis. Future work includes varying size and defects in the system, as well as applying various parameterizations of the ReaxFF potential.

Physical Science

Poster Number 75: Qichange Hu

Photoelasticity

The stress distribution in a stereotomic structure is not easy to be analyzed because of its complex interlocking assembly structure. Photoelasticity is a classical method in experimental mechanics and would be a solution to find the load path of a interlocking assembly. In this project, the interlocking structure would be constructed by 3-D printed tetrahedrons. The load will be applied on in-plane direction and the load path will be observed and analyzed.

Physical Science

Poster Number 79: Nicholas Macke

Characterization of poly(sodium acrylate-co-acrylamide) in aluminum solutions

Over the past few decades, super absorbent polymers (SAPs) have been the topic of research projects all around the world due to their incredible ability to absorb water. They have applications in everything from disposable diapers to high performance concrete. In concrete, aqueous cations permeate the polymer network, reducing swelling and altering properties. One of these ions, aluminum, alters SAP properties by creating a stiff outer shell and greatly reducing absorbency, but these effects have not been well characterized. One method of characterizing the effect of aluminum on SAP hydrogels was gravimetric swelling tests to determine equilibrium water capacity at different aluminum ion concentrations. Compressive strength was also determined for swollen particles using a rheometer to perform the compression testing. Results from this testing showed that solutions with low concentrations of aluminum ions take several hours to permeate the polymer network and reduce swelling

capacity, while high concentration solutions are able to limit swelling immediately. The compressive strength of the gel was increased greatly in polymers containing mostly poly(acrylic acid), showing that the aluminum ions interact more strongly with the charged acid groups than the neutral amide groups. These results help elucidate the negative effects that may be caused by multivalent cations in various SAP applications. Further research will include studying the interactions of aluminum ions with polymer strands using polymer brushes on a quartz crystal microbalance. This will hopefully reveal the mechanism and kinetics of salt absorption in polymer networks.

Physical Science

Poster Number 93: Haoze Zhou

Experimental Study of Breakage of Particles under Compression

Granular materials are used widely and can be seen in natural and industrial applications such as sand bags or pharmaceutical pills. During their manufacturing, processing, transport and use, granular materials are subjected to various kinds of loadings. If the amplitude of the loading is above the strength threshold, particles constituting granular materials may fracture. It is very important to understand the failure of particles under these loading conditions to prevent or control their failure during all stages of their manufacturing and use. Better characterization of the fracture behavior of particles composed of different materials and sizes will allow more precise application and better maintenance of granular materials in commercial usage. The effects of size and material properties on the deformation and fracture behavior of granular particles are studied by investigating particles from three different size ranges for three different materials. The mechanical behavior is characterized by force-displacement and stress-strain plots under quasi-static compression (strain rate = $10^{-2} * s^{-1}$). Along with the deformation behavior, the strengths of particles are also recorded and Weibull distribution is fitted to the fracture stresses. It was observed that the smaller particles break at lower forces but actually withstand higher stress at fracture. The calculated Weibull moduli for different size range and materials show that the flaw population from the manufacturing process is different for different sizes and materials. This study shows that size and material properties alter the fracture stresses. Future experiment can be performed for the same particles under dynamic compression to better understand effects of strain rate on the fracture of particles.

Social Science/Humanities

Poster Number 66: Yichen Fan

Comparison of Live and Archived-Mode Learners in an Advanced Engineering MOOC

Massive Open Online Courses (MOOCs) aim to teach highly technical content to learners from different backgrounds around the world at a much greater scale than the traditional classroom. To fully capture the value of MOOCs and related open online materials, it is important to

research those who study course materials after the course has finished, and the professor is no longer actively involved.

The purpose of this study is to understand the similarities and differences between live and archive learners in a highly-specialized engineering MOOC. The researchers compare certain characteristics in live and archive learners: specifically, their intentions in using the learning materials, their educational background, and their previous course-related experiences.

The study used a pre-survey of 26 questions to collect data for this study. Live and archive groups were compared to find similarities and differences in how learners intend to use the course materials, their background knowledge of the subject and what they hoped to gain from the materials. In the end, an effect size analysis will be performed on the various hypotheses to quantify the statistical significance of the results.

Initial results show that live mode learners are more likely to have one or more semester of calculus classes and previous course-related experiences than archive mode learners. Learners who took the course in an archive mode are also less likely to spend six hours per week or more on the material. Not surprisingly, they are also much less likely to aim for a high grade in the course. We will conclude by providing recommendations for future research, and its potential impact on designing MOOCs to benefit both live and archive mode learners.

Social Science/Humanities

Poster Number 67: Daniel Franz

Coal Ash Contamination: A Study in National Policy Hitting the Ground in Indiana

Burning coal for electricity generation produces a physical byproduct called coal ash that presents a potential environmental contamination if not disposed of properly. As one of the top ten coal production states and the leader in number of coal ash disposal sites, Indiana is particularly affected by changes in coal ash regulation. New federal regulations have recently been set by the EPA under RCRA Subtitle D to handle coal ash disposal. Before the new regulations were set, coal ash regulation was left to the state. In Indiana that regulatory freedom took the form of no regulations in regards to coal ash. Although there were no regulations, there was not necessarily no measures taken to ensure safe and responsible coal ash disposal. The purpose of this research is to determine exactly how operating procedures for coal ash management and disposal will change in Indiana due to the new EPA rules. The baseline for the comparison is determined through examining the operating procedures present in 2011 and 2012 when the EPA ordered a Regulatory Impact Assessment on Coal Ash in preparation of developing the new rules. The new operating procedures is examined through a combination of directly examining the EPA policies and looking at the already existing efforts by the various Indiana power companies to meet the policy. There are many changes in how coal ash will be managed in the future with a particular focus in documentation, monitoring, assessment, and visibility. These changes present significant opportunities for sound

environmental stewardship as well as increased citizen and corporate responsibility with regards to coal ash in Indiana.

College of Health and Human Sciences

Life Science

Poster Number 94: Joseph Amaro

Optineurin and the Pathogenesis of Parkinson's Disease

Parkinson's disease (PD) is a progressive neurodegenerative disease characterized by the loss of dopaminergic neurons in the substantia nigra pars compacta and the presence of intraneuronal Lewy Bodies. PD stages are linked to the progression of Lewy body pathology throughout the brain, which is believed to precede neuronal loss and is likely a result of autophagic dysfunction. Optineurin (OPTN) is a known cargo adaptor in autophagy, and mutations in the gene are linked to glaucoma and ALS. It is currently unknown if or how OPTN may play a role in PD pathogenesis, but OPTN is involved in many cellular and molecular pathways that are perturbed in PD. Thus, we characterized OPTN expression in specific brain regions that succumb to Lewy body pathology during the progression of PD; to model PD stages, we dosed rats with rotenone for 24h, 5 days, or until end-stage disease phenotype was apparent. Additionally, we considered how OPTN colocalization to autophagosomes might be affected.

Life Science

Poster Number 95: Sarah Barnes

Telemedicine in Parkinson's Disease Research

I am completing my thesis in Dr. Jessica Huber's lab, which has a focus on studying behavioral treatments for Parkinson's disease, including an interest in the speech of this population and a device that Dr. Huber created to help relieve specific problems (Speech Vive device). My thesis examines a case study of a gentleman with Parkinson's disease who received six 1-hour telemedicine sessions over 6 weeks and used the Speech Vive device. My

thesis is a walk-through of the treatment this man underwent and the perks of telemedicine from his perspective.

Life Science

Poster Number 101: Meredith Cervi

Analyzing the Effects of Lead and Manganese Exposure on Blood Pressure among US Children and Adolescents

Exposure to metals such as lead can impair cardiovascular health. This study examined the extent to which combined exposure to lead and manganese is associated with blood pressure; as elevated blood pressure is a risk factor for chronic cardiovascular disease. This cross-sectional study includes 1,465 children and adolescents aged 8-17 years from the 2011-2012 National Health and Nutrition Examination Survey. Children were included in the analysis if they provided blood samples and had complete data on blood pressure, total blood lead. Blood pressure was calculated as the average of three seated measurements, and was treated as continuous. Whole blood samples were analyzed for lead and manganese; the natural logarithms of lead and manganese were used, as these variables were lognormally distributed. All analyses incorporated appropriate weights and methods to account for the complex survey design. Linear regression models were adjusted for body mass index percentile, parentâ€™s education level, serum cotinine, age, and sex. The geometric mean for lead was 0.58 Âµg/dL and for manganese was 10.24 Âµg/L. The average blood pressure was 119 mmHg (systolic) and 67 mmHg (diastolic). An adjusted linear regression showed a statistically significant increase in diastolic blood pressure with increasing lead exposure (Î²=1.87, 95% CI=0.22, 3.52), in a model which did not adjust for manganese. There was no statistically significant association of manganese alone or in combination with lead with any measure of blood pressure, or of either metal with systolic blood pressure. Our results, that lead is associated with increased diastolic blood pressure, are consistent with previous publications. Although lead exposure has dramatically declined in the United States, exposures of concern still occur. Therefore, increased efforts to reduce and prevent lead exposure are recommended.

Life Science

Poster Number 103: Jennifer Davis

Visually assessing accumulation of Manganese in the brain using MRI after occupational exposure

Manganese (Mn), a common mineral in a typical human diet, is a neurotoxin when it accumulates in the brain in large amounts. 47 welders and 38 controls were recruited since 2013 to take part in this study. By using magnetic resonance imaging (MRI), relative levels of Mn in the brain were measured using imaging parameters such as the R1, which has been shown to be proportional to Mn accumulation in the region. R1 in different regions of the brain was correlated against two measurements of exposure (cumulative Mn exposure and total number of years welding), one measurement of body accumulation (Mn content in toenails) and one measurement of motor dysfunction (UPDRS). Visual analysis of the data showed that there were no linear trends when assessing the group as a whole. While it is known that Mn accumulates in the brain after occupational exposure, the lack of trends in the data suggests that the underlying mechanism of deposition in the brain is complex. Future analysis will require careful characterization of subjects to determine whether there are other confounders influencing the results.

Life Science

Poster Number 105: Whitney Diep

Development of the Cerebral Manganese Concentration Toolbox

A considerable amount of manganese (Mn) in the brain can disrupt biological processes within the basal ganglia, causing neurological disorders similar to Parkinson's disease. With Magnetic Resonance Imaging (MRI), manganese can be measured based on the T1 relaxation time differences altered by the paramagnetic property of Mn. T1 relaxation time can be mapped through the variable flip angle method, which also offers high-resolution brain scans within only few minutes. In order to reconstruct the T1 map offline as well as to measure the Mn distribution, we have developed a user-friendly toolbox that combines image reconstruction with interactive and automated possibilities for selection of brain regions in the T1 maps. The novel Cerebral Manganese Concentration (CMC) Toolbox allows the user to obtain the T1 value for user-selected structures within the brain as well as an overview of the whole brain. The CMC toolbox has unique features that would allow for the user to adjust contrasts and properties of the brain scan image to display the deep structure in the brain, to collect and export large amounts of data, and to select specific region with either free-drawn or circular shape marking tools. In order for the user to receive reproducible data, any user-defined areas created previously can be saved with its file name in order to be applied again later to the brain scans. Future additions will allow users to import different types of common medical image formats as well as to provide another method of T1 calculation, making this toolbox more widely applicable to researchers.

Life Science

Sex Related Fear Behavior and Safety Signal Learning

The inability to distinguish safety from fear is a biomarker of PTSD and has damaging effects on everyday functioning. Despite the higher diagnosis of PTSD in women, research using female rats has been lacking. A recent experiment discovered that female rats exhibit another fear behavior, quick "darting" movements (Gruene et al, 2015). We examined how sex-mediated fear behavior in male and female rats differ during safety signal learning to test the hypothesis that females will show a different fear behavior profile compared to males during this learning. Male and female rats underwent four discriminative cue sessions (DC). During DC, rats were exposed to four cues: Fear (tone A), Safety (light), Fear+Safety (tone A+light), and Reward (tone B). The Reward cue was paired with sucrose and the Fear cue was succeeded by a mild footshock, whereas the Safety cue and the Fear+Safety cue were not. The Fear and Safety cues (tone A, light) were counterbalanced and shock sensitivity levels were compared in male and female rats. Time spent freezing, darting and reward seeking were quantified. Preliminary data show females exhibit equitable levels of freezing to the Fear and Fear+Safety cues, indicating they are generalizing their fear response to the safety cue. In contrast, male rats show reduced freezing to the fear cue when in the presence of the safety cue. Differences in female rats' learning of safety signals suggest the need for research on the underlying neurological processes, which may lead to gender-specific treatment techniques for PTSD and related anxiety disorders.

Life Science

Poster Number 115: Erin Kay

Changes in Cellular Prion Protein Following Manganese and Lead Exposure

The prion protein (PrP) is known to play a critical pathogenic role in the prion disease, an infectious spongiform encephalopathy typically seen in the "mad cow" disease or prion protein scrapie (PrPSC). The natural function of cellular prion protein (PrPC) is hypothesized to be a Cu-binding protein with a potential role in cellular Cu transport and uptake. It is known that Mn exposure can increase prion protein levels in the brain. This study was conducted to test the hypothesis that Mn and Pb coexposure to PrPC changes its expression and localization. We will use a Z310 cell line established by this lab as a cellular model of the BCB. Our work has shown that mRNA levels did not change upon exposure to Mn. We immunostained Z310 cells for PrPC and counterstained with nuclear stain Topro-3 to visualize changes in localization and levels of PrPC expression. We expect to see an increase of PrPC following Mn exposure and

perhaps a greater increase in Mn and Pb coexposed groups. This work may have clinical implications for welders, smelters and those living near those industries.

Life Science

Poster Number 116: Natalie Lamport

Neuroinflammation and Structural Change in Response to Radiation

Radiation therapy is part of the current medical standard for the treatment of brain tumors. However, late effects of radiation therapy, including radiation necrosis and white matter changes, are extremely common and can dramatically alter quality of life. Symptoms include seizures, memory loss, attention problems, and decrease in IQ. The injurious and reparative sequence of events following exposure to radiation is currently unclear. The goal of this project is to track structural changes and neuroinflammatory tendencies following irradiation of the mouse brain. Mice were irradiated in sets of five, receiving 10, 15, 20, 25, or 30 Gray to the whole brain. Respective sets of mice were sacrificed and their brains extracted at four, eight, twelve, and sixteen weeks post irradiation. Standard magnetic resonance imaging (MRI) was also performed at each time point, but no evidence of injury was visible. Brains were processed and stained using hematoxylin and eosin to visualize basic structural changes, anti-S100 immunohistochemistry to indicate the presence of astrocytes, and anti-myelin basic protein immunohistochemistry to track white matter changes. Results from light microscopy of these sections show subtle white matter changes that begin to paint a picture of the brainâ€™s response to radiation damage; white matter damage appears at four weeks post irradiation, seems to normalize by week eight, reappears at week twelve, and continues worsening into week sixteen. A better understanding of these mechanisms will be imperative to developing therapies to prevent and treat long term complications associated with radiation therapy.

Life Science

Poster Number 120: Destiny Matthews

THE DEPENDENCE OF MOOD AND MENTAL FUNCTIONING ON GLYCEMIC STATUS: A PILOT AND FEASIBILITY STUDY

Background: Depressive symptoms in adults with diabetes occur at a higher prevalence when compared to the general population. However, this relationship has not been examined in depth during childhood and adolescence.
Objectives: This research project is a pilot and feasibility, observational study exploring the relationship that exists between high blood glucose concentrations (hyperglycemia) and depressive symptoms in adolescents who are overweight and obese and vary in glycemic

status. The main hypothesis is that there will be an association between hyperglycemia and elevated scores for depressive symptoms.

Methods: The DIGIT study assesses the impact of a health coaching intervention versus a single dietary consult to improve diet and physical activity and reverse prediabetes in adolescents who are obese. During participant screening, information is obtained about behavioral risk factors for diabetes including diet, physical activity, adiposity, and sleep as well as psychosocial factors. The information collected for pilot study will feature questionnaire data (Patient Health Questionnaire 9, PedsQL) and laboratory values (average fasting plasma glucose, HbA1C) from the DIGIT Study. The statistical analysis will include correlations between plasma glucose and scales measuring depressive symptoms. Qualitative data will be utilized to confirm the depressive symptoms in participants.

Results: At screening, it was established that 12 of the adolescents had a normal glycemic status, and 11 of them had prediabetes. It is expected that, as a continuous variable, hyperglycemia will be positively associated with higher scores for depressive symptoms. Gender, age and ethnicity may modify these symptoms. Finding a significant correlation between hyperglycemia and depressive symptoms in an adolescent population will provide a basis for examining the mechanism in future research.

Life Science

Poster Number 122: Courtney Oare

Grey Matter Atrophy Associated with Motor Dysfunction in Parkinson's Disease

Parkinson's Disease (PD) is a progressive neurodegenerative disorder with common symptoms such as rigidity, tremors, and bradykinesia. While current medication can alleviate symptoms, no treatment exists to stop or slow disease progression. There is an unmet need for a biomarker associated with progression that could aide in development of treatments for disease progression. The purpose of this study is to investigate the association between grey matter (GM) atrophy and motor dysfunction in PD subjects, as a biomarker.

MRI and voxel-based morphometry methods were used to investigate GM atrophy and the association with motor impairment in 43 PD and 59 control subjects. T1-weighted whole-brain MRI images were acquired in collaborative studies in Germany and at Indiana University on 3T MRI scanners. Group differences in GM density between PD and control subjects were examined pixel by pixel with SPM 12 using cluster-corrected two-sample t-tests. Among PD subjects, associations of GM density with motor dysfunction (measured by UPDRS-III) were analyzed by multiple regression.

Compared to controls, PD subjects show significant GM atrophy in the supplementary motor cortex (p < .005). This is a critical brain region, linking cognition to action. Among PD subjects, there is a significant association (p < .001) of GM atrophy with motor dysfunction (high UPDRS-III) bilaterally in the superior parietal lobules of the motor cortex. These findings agree with the hypothesis that motor dysfunction is associated with GM atrophy in the motor cortex, a good display of neurodegenerative progression in PD.

Poster Number 123: Emeral Obie

The Spatial and Verbal Memory Impact on the Simon Effect

Zhao, Chen, and West (2010) conducted an experiment that explored the cognitive area of working memory and how it could influence the Simon effect. This effect is that responses to stimulus color are faster when the irrelevant left or right stimulus location corresponds with the response location. In their study, an influence was found in relation to verbal memory, but the Simon effect was "insensitive" to spatial memory. My study is exploring this further in an attempt to replicate and extend what they found. To do this, we are continuing to test whether working memory loads can alter the response times and accuracy that result from a Simon task. Participants completed the Simon task alone and in the context of a working memory task. For the Simon task, participants responded with left and right keypresses to the colors of squares that varied in location (left or right). The results of the first part of the study showed that I was able to obtain a significant Simon effect among our participants. The next part tests the influence of spatial and verbal working memory loads on the Simon effect. During the dual-task, the participants are presented with a group of five squares (spatial memory load) or five letters (verbal memory load), followed by a Simon stimulus, and finally a memory test that is related to what was shown initially. Preliminary results show that the Simon effect was reduced during the spatial task, but not during the verbal task, which is opposite to the prior findings. This difference may be due to the spatial task consisting of images that are the same shape as the images used for the Simon stimulus. With the participants' focus already on squares during the memory load, it would have been easier to respond to the time-sensitive Simon task.

Life Science

Poster Number 124: Abby Oliver

Voice Outcomes Following a Traditional and a Novel Head and Neck Strengthening Exercise: Preliminary Results

There is emerging evidence that head and neck strengthening exercises aiming to improve swallowing function in individuals with swallowing disorders, may also improve vocal function. This study is a randomized clinical trial aiming to examine the vocal effects of two head and neck exercises, i.e. the traditional Head-Lift Exercise (HLE) and the newly developed Recline Exercise (RE) (developed by our lab), in healthy older adults. The study is ongoing. Thus far, twelve subjects (5 females) between the ages of 60 and 85 have participated. Subjects were randomly assigned to either the HLE (N=6) or RE (N=6) protocol. Each group performed their assigned protocol for six weeks. Ceiling and basal frequencies of vocal range, self-perceived

phonatory effort (PPE) and Cepstral Peak Prominence (CPP) on sustained vowels and connected speech were collected both pre- and post-treatment in order to measure voice function. Both groups experienced a significant increase in ceiling pitch frequency (p=.034), indicating an increase in upper pitch range following both protocols. No differences were observed between groups. In addition, PPE ratings decreased in participants in the RE group (p=.028), indicating a decline in self-perceived vocal effort following the RE. No change in PPE was observed in the HLE group. No significant changes were observed in CPP on sustained phonation or connected speech following either exercise. These preliminary results suggest that both exercises may have beneficial effects on voice range, while the RE may also have effects on vocal effort. These preliminary results are promising, but further investigation is warranted.

Life Science

Poster Number 127: Leeah Reidenbach

Expression of rnf14 and ttc3 are Consistent During Zebrafish Embryonic Development with Expression Only Altered for ttc3 at 60 hpf with Atrazine Exposure

Atrazine is an herbicide commonly applied to crops in the Midwest part of the United States. The chemical moves into drinking water sources after rainfall events. The United States Environmental Protection Agency (EPA) set the Maximum Contaminant Level (MCL) at 3 parts per billion (ppb) in drinking water, but even these levels are suspected to cause adverse health effects. Developmental exposure to atrazine is reported to increase birth defects and result in endocrine disruption. Previous studies in our laboratory have shown that genes have altered expression in the zebrafish after an embryonic exposure to atrazine. Two of these genes, rnf14 and ttc3, were further tested in this study. rnf14 is a gene that interacts with the androgen receptor. When expression of rnf14 is increased, it is expected to cause abnormal cell growth and lead to carcinogenesis. ttc3 is expected to be involved with neuronal proliferation and differentiation when expression is increased. Overexpression of ttc3 leads to strong inhibition of neurite extension. The purpose of this experiment was to first determine how gene expression changed over the zebrafish embryonic developmental time course at 24, 36, 48, 60, and 72 hpf. Then, gene expression was assessed following atrazine exposure at 0, 0.3, 3, or 30 ppb at developmental time points. The data shows that the rnf14 and ttc3 expression is steady throughout embryogenesis with no significant change (p>0.05) and that changes caused by atrazine exposure only occurs at the time points of 60 (p=0.0099; n=6) and 72 hpf for ttc3 and only at 72 hpf for rnf14.

Life Science

Poster Number 131: Gabrielle Steigerwald, Madyson Moyer, Megan Smit

Experimental Evaluation of Mobile Technology for Generative Language Training in Severe Autism

One of severe autismâ€™s hallmark deficits is in a â€œdelay in, or total lack of, the development of spoken languageâ€ (American Psychiatric Association, 2013). Many learn to communicate through alternative means such as using tablets and mobile technology. However, utterances on these devices are often very limited and do not surpass single-word responses. Matrix training is a language intervention to systematically build up vocabulary and teach longer word combinations. Words are arranged in a matrix format so that some multiword phrases are taught and others develop without direct instruction. This study aimed to answer: 1. Does matrix training with a mobile application, SPEAKmore!, facilitate production of new word combinations? 2. Do newly learned skills generalize to untrained word combinations? An experimental multiple probe design (Horner & Baer, 1978), was used across sets of action-object combinations with generalization probes of untrained combinations. This design was implemented with five participants, between 8-15 years, diagnosed with minimally-verbal autism. These students were taught action-object combinations on a 6x6 matrix with SPEAKmore! Preliminary results show a pattern of successful acquisition of symbol combinations during the intervention condition and subsequent generalization to untrained stimuli. During intervention participants on average mastered over 80% correct of the presented stimuli, and their performance remained at this level. Performance on generalization increased steadily during intervention. Effect sizes as measured by the Non-overlap of all Pairs Index reveal medium-strong to strong effects. These findings suggest that matrix training through a mobile application may be a promising approach to teach new vocabulary and enhance the complexity of utterances in severe autism.

Life Science

Poster Number 133: Mitchell Tillman

Uncertain Motor Plans Lower Stability of Current Prehensile Behavior

To successfully perform a motor task, the body must be stabilized to contend with gravity and environmental disturbances. However, to transition to any other motor task the system must destabilize. Thus momentarily the motor priorities conflict: maintain the current stability, and prepare for the next task. Previous work has examined switching tasks when the requirements of the next task are pre-specified. Here, we are interested in the stability of finger forces when there is an unspecified expectation of movement. We argue that this expectation lowers the

stability of the current state to account for motor uncertainty, and that stability progressively decreases as task difficulty increases.

To test our hypotheses, 25 adults (20.4Â±2.5 yrs) pressed with their 4 fingers of the dominant hand on 4 force transducers to produce one total force FT, shown on a computer screen as an X cursor. They were instructed to keep the cursor inside of the target while it stayed stable, moved slowly, or moved quickly. Stability was quantified by computing the normalized covariance CN - the degree to which each finger compensated for the errors of another, compared to the variance in the output, FT. We conducted a 2-way Task x Phase ANOVA and found that for the dexterous tasks after 4s of constant force, stability was 7% lower than the stable task. We also found that CN decreased with task difficulty.

This is the first demonstration of task-specific stability modulation in hand function. We show limited destabilization lasting more than 8x longer than previously reported that facilitates movement as required. Our results have implications for the understanding and clinical assessment of manual dexterity. For example, this mechanism could help further our understanding of age-related manual dexterity loss. In the future, we intend to explore this concept in elderly individuals and other motor behaviors.

Life Science

Poster Number 134: Erin VanHoosier

The Effect of Chronic Feeding of Dietary Protein and BCAA Supplementation on Bone Health and Inflammatory Gene Expression in Aging Mice

Aging and diet influence the development of chronic diseases. Limiting dietary protein or supplementing with branched-chained amino acids (BCAA) may extend lifespan. However, how total protein and BCAAs interact to impact long-term bone health and inflammatory gene expression is unknown. Our objective is to determine how chronic feeding of diets differing in dietary protein and supplemented with BCAAs affect bone health and inflammatory gene expression in aging mice. Four month old C57BL6/J mice were randomized to one of four diets: AIN-93M (14% protein), AIN-93M supplemented with BCAA, low protein (7% protein), or low protein supplemented with BCAA and fed for 12 months. Femur bone mineral density (fBMD) and content (fBMC) were analyzed by dual-energy X-ray absorptiometry at 0, 6, and 12 months. Bone marrow was extracted from mouse femurs for inflammatory gene expression analysis. Our results indicate that fBMD increased ($P<0.05$) over time. There was an interaction ($P<0.05$) between BCAA and dietary protein driven by the low-protein supplemented with BCAA group, which did not change fBMD. fBMC had an interaction ($P<0.05$) between protein and time, and BCAA and time, which were driven by decreases in fBMC in the low protein group supplemented with BCAAs. Targeted PCR arrays identified 19 differentially expressed inflammatory genes. BCAA supplementation increased ($P<0.05$) expression across many genes. In conclusion, dietary BCAAs were able to drive inflammatory gene expression in bone marrow and the low-protein BCAA supplemented group appears to have a different pattern of change in fBMC and fBMD than the other dietary treatments.

Life Science

Poster Number 137: Kendal Weger

Detection of Atrazine in Embryonic Tissue of Zebrafish

Atrazine is a common herbicide used in agriculture to kill broadleaf weeds. This synthetic chemical is the second most widely used herbicide in the United States with volumes of 76 million pounds per year being used. Atrazine is commonly reported to contaminate drinking water sources resulting in human consumption. The US Environmental Protection Agency currently regulates atrazine at a maximum contaminant level (MCL) of 3ppb, but there are concerns on the health risks associated with this exposure level. While atrazine concentrations are routinely monitored in water samples, the available protocols for measuring atrazine in tissue are limited. In this study, multiple testing methods including ELISA, LC-MS, and GC-MS were employed to develop a sensitive protocol to measure atrazine in tissue. The ELISA assay was unsuccessful as a result of cross-reactivity with the zebrafish tissue. The LC-MS protocol was able to detect atrazine in tissue when the larvae were exposed to 1000 or 10,000ppb during embryogenesis, but was not able to detect atrazine following a developmental exposure of 3ppb. As a result, current work is now focused on using GC-MS. At this time, seven standards of atrazine (1000ppb, 500ppb, 300ppb, 100ppb, 50ppb, 30ppb, and 3ppb) have been run using GC-MS, and it was found that all concentrations were detected. The lowest concentration of 3ppb, however, was detected but not measurable. As such, we are continuing to refine a protocol to successfully measure the dose of atrazine in tissue following lower concentration exposures.

Life Science

Poster Number 138: Rachel Yuska, Natalie Lamport

Evaluating the Differences Between Sexes of Mice in Response to Brain Radiation

Radiation is considered an effective form of therapy when treating brain tumors. Like with any other therapy, radiation comes with risks of potential side effects. Female pediatric patients have shown to suffer from radiation side effects more than male patients. When scientists try to study the after-effects of radiation in the brain using animal models, such as mice, one sex is usually chosen for all experiments. However, we cannot assume what we see in males is the same as what we will see in females, or vice versa. My hypothesis is that female mice will tend to show the greater sensitivity to the effects of irradiation. Comparing the model of the female mouse brain to the male consisted of two parts: Radiation of the mice and staining of the brain

tissue post mortem. Groups of both male and female mice were irradiated at 10, 15, 20, 25, and 30 Gray. Mice were euthanized at 4, 8, or 16 weeks post irradiation. The brain tissues of the mice were then stained with Hemotoxylin and Eosin, (H & E), and compared. All the observed damage in the brain tissue was localized to the white matter track. The features of the injury seen in the H & E section looked slightly different between the males and females. However, the severity of pathology was similar for both groups. The mouse model for radiation can now be used with the knowledge that the difference in each sexâ€™s response to radiation should be accounted for in future experiments.

Life Science

Poster Number 139: Jieqiong Zhou

Correlation between tea consumption with blood and bone manganese (Mn) concentration in Chinese workers

Manganese (Mn) is a micronutrient essential to human health as well as plant growth and health. Studies show that the tea plant has the ability to accumulate high concentration of Mn without showing any signs of toxicity. Therefore, individuals who are heavy tea drinkers may have a higher intake of Mn. We did a cross-sectional study of 60 Chinese males (30 with occupational Mn exposure; 30 without occupational Mn exposure) with an average age of 47. Questionnaires were used to assess their personal information, work history, medical history, and diet. Their blood was collected using BD Vacutainer Trace Metal Tubes and whole blood analyzed for Mn concentration using inductively coupled plasma mass spectrometry (ICP-MS). Bone Manganese (BnMn) was measured using Neutron Activation Analysis (NAA). We used linear regression models to assess the correlation between tea consumption with blood Mn and BnMn concentration in all participants and in those without occupational Mn exposure, controlling for age and education. The results show that there is a positive unadjusted association between tea consumption and BnMn (Î²=1.606, p = 0.018). When age and education are included, this is still significant (Î²=1.514, p= 0.032). Among those without exposure to occupational Mn, the correlations between tea consumption and BnMn are also positive (Î²=1.286 unadjusted; Î²=1.249 adjusted), but are not statistically significant. Overall, there is a slight decline in the correlation between tea consumption and BnMn when age and education are included. The results show a negative correlation between tea consumption and blood Mn. However, the results are not statistically significant. In conclusion, we found an association of tea consumption with bone, but not blood Mn; age and education are also associated with BnMn. The next steps for this project are to evaluate the effect of other nutrients and long-term job history on these associations.

Physical Science

Poster Number 126: David Putt

3D Printing Air Emissions

Objectives: The objective of this project is to provide the basis for a recommendation of the locations and ventilation requirements for 3D printers on the Purdue Campus. Air samplings performed will characterize printer emissions and be checked against regulatory standards for recommendations to be set.

Methods: Sampling will be done in Purdue's 3D printing labs using a ppbRAE photoionization detector (PID) and SidePak personal aerosol monitor. The ppbRAE measures the presence of volatile organic compounds (VOC) at the parts-per-billion (ppb) detection level. The SidePak personal aerosol monitor is a laser photometer showing aerosol mass concentration data and eight-hour time-weighted average (TWA). The samples will be taken during busiest printing times to simulate worst-case scenario of exposure during printing.

Results: Preliminary results showed that average exposure levels were below industry regulations, however, there were peaks that exceeded recommended limits sporadically throughout some of the sampling periods. More data is needed to determine cause of peak exposure.

Discussion: Based on current findings, more data needs to be collected like that for compound specific exposure. This plans to be done in the future using badges or air vacuum canisters. Other factors also need to be taken into consideration such as air current turnover rate in the printing room. With sufficient data like this, protocols on future ventilation guidelines can be created and distributed to Purdue's 3D printing locations.

Physical Science

Poster Number 136: Emma Wallens

Accuracy of Portable L X-Ray Fluorescence (L-XRF) Machines to Quantify Lead in Condor Bones In Vivo

Critically endangered condors are exposed to lead from ammunition embedded in the carcasses that they scavenge. Acute lead poisoning results in death for many of these animals through the paralysis of the neuromuscular system controlling peristalsis (Cade, 2007). Researchers have been using blood lead levels as biomarkers of exposure, and, based on this testing, many birds were released back into their environments showing normal lead levels. The half-life of blood lead in condors is approximately 13 days (Cade, 2007); it is important that researchers look at bone lead content instead to assess the chronic effects of the lead toxicity. Bone has a low turnover rate, can be stored in bone for decades in humans, and contains roughly 94 percent of the total lead body burden. (Auf der Heide and Wittmets 1992). Our lab has been working on the development of a portable L-shell x-ray fluorescence (LXRF) device to quantify lead in bone in human in vivo. The purpose of this project is to determine the accuracy of the portable LXRF machine in measuring the lead content of condor cadaver bones. The system was calibrated with Pb-doped bone-equivalent phantoms. The detection limit was calculated to be

1.9 ppm. 17 condor cadaver bones were measured and a significant correlation was observed between the bone Pb concentrations measured by the portable XRF and ICP-MS ($R2 = 0.67$).In conclusion, we found that portable XRF is an accurate method to measure Pb in condor bone. Further studies on the reproducibility of measurements are being conducted.

Social Science/Humanities

Poster Number 96: Kelsie Basile

Feminine hygiene knowledge, attitudes, and practices among college-aged women

Introduction. Women engage in a wide range of genital hygiene practices, including washing and douching. Women who are currently partnered and engaging in various sexual behaviors are more likely to utilize feminine hygiene products, such as wipes and washes for reasons related to odor control, cleanliness, and yeast infections, among others.
Aims. The purpose of this study was to understand the relationship between college women's feminine hygiene practices, genital self-image, and sexual behaviors.
Methods. Data were collected during Spring 2014 from college women aged 18–24 years living in South Carolina. Overall, 663 participants completed an online survey and 53 completed one-hour in-depth interviews. Interview questions covered feminine hygiene practices, genital self-image, and sexual behaviors.
Main Outcome Measures. To develop a rich understanding of women's genital hygiene practices.
Results. Most survey participants had a history of vaginal intercourse (79.8%; n=529) and receiving oral sex (81.6%; n=541). The seven-item Female Genital Self-Image Scale resulted in a mean score of 21.374.08. Emerging interview themes were: 1) the role of the media and advertisements; 2) cleanliness/odor removal; 3) menstruation maintenance; 4) medical concerns; and 5) douching.
Conclusion. Findings suggest women engage in various genital hygiene practices, including using a host of feminine hygiene-related products. Results provide insight into how women feel about their genitals, and ways they try to improve their odor and appearance. Clinicians and health professionals can utilize this information to build messaging related to safe genital hygiene practices, especially for females who initiate feminine hygiene product use and sexual behaviors concurrently.

Social Science/Humanities

Poster Number 97: Natalie Bengert, Madeline Holen, Francis Vitti

Effects of Child Behavior on Parenting Stress in Children with Neurogenetic Syndromes

Effects of Child Behavior on Parenting Stress in Children with Neurogenetic Syndromes
Francis Vitti, Natalie Bengert, Madeline Holen, Emily Abel, and Bridgette L. Tonnsen

Increased parenting stress has been associated with problem behaviors in children, particularly those with neurogenetic disorders (e.g., Van Lieshout et al., 1998). The present study looks at a sample of 48 infants with neurogenetic disorders, including Williams syndrome (n=13), Prader-Willi syndrome (n=15), Angelman syndrome (n=20), and 21 typically developing (TD) controls between the ages of 18 and 53 months. We aimed to determine (1) Which child behaviors within syndrome groups are the best predictors of parenting stress, and (2) whether parenting stress scores differ significantly among syndrome groups and TD children. We hypothesize that externalizing behaviors will be the best predictor of parenting stress and that parenting stress will be higher for the parents of children with genetic disorders. Since these effects are likely bidirectional, understanding the relationship between parenting stress and child behaviors can lead to interventions for parents and children, thereby providing better outcomes for families in the future.

Social Science/Humanities

Poster Number 99: Derek Carroll

Turnover Within the Millennial Generation

As the 21st century begins to shape job markets and job experience more than ever before, there are several trends which employers are forced to confront if they wish to be successful in recruiting and retaining the next generation of employees: the Millennial generation. These Millennial workers bring along with them the potential for new workplace values, new sources of motivation, new communication standards, etc. What is troubling for employers, however, are high turnover rates among Millennials (Kowske, Rasch, & Wiley 2010; and others). These high rates have become increasingly important for companies to understand, as higher job turnover is a drain on valuable time, resources, and money. There is already a wealth of knowledge existing in the literature regarding Millennial turnover. Based upon that knowledge, this paper will explore what psychological explanations are available for Millennial turnover, and determine whether that knowledge should guide further action in applied settings.

Social Science/Humanities

Poster Number 100: Rebecca Cavin

Latino migrant farmworker families and the influence of parent-child communication on adolescent alcohol and tobacco intentions and use: A systematic review of the literature

Background: Latino youth in migrant farmworker families (LMFW) are a subpopulation with increased risk for alcohol and tobacco (A&T) use. Research suggests that contextual stressors associated with a migratory life-style (e.g. poverty, acculturation, sub-standard housing, and educational instability), as well as age, gender, and school performance, may contribute to their increased A&T risk. Parent-child communication related to A&T has emerged within the public health literature as a promising influencer on adolescent substance use. The purpose of this systematic review was to explore what is known about the ways in which parent-child communication about A&T influences Latino adolescents, in particular LMFW teens’ intentions to use A&T, as well as how it might influence these teens’ substance use behaviors.

Methods: We searched the databases of CINAHL, Cochrane Library, ERIC, Prospero, PSYCInfo, and PubMed through March 2017. These searches identified 415 articles. After duplicates were removed, 342 articles were screened by two independent reviewers. To be eligible for full-text assessment, articles had to be non-trial studies conducted in the U.S. and pertaining to parent-child communication about alcohol and/or tobacco among Latino adolescents.

Results: We included 36 articles based on their focus on parent-child communication about alcohol and/or tobacco among Latino adolescents.

Discussion: This systematic review suggests that parents can play a critical role in influencing adolescent substance use, however differences emerged among the studies related to how the construct of communication was examined. Moreover, only one study discussed LMFW families thus, this review illustrates a pressing need for further research to understand parent-child communication within this particular population.

Social Science/Humanities

Poster Number 102: Abigail Chapleau, Sara Loerch

Voice measurements on exaggerated emotional vocal qualities

Exaggerated emotional and inflected vocal qualities may lead to a strained voice over time. We investigated whether the acoustic and perceptual attributes of voice would be altered during and after the production of exaggerated happy and sad vocal qualities. Twenty healthy, non-dysphonic participants (equal males and females, ages: 20-30 years) read the standardized Rainbow Passage in happy and sad exaggerated voices. Cepstral voice measures were obtained prior to and after the emotional productions. Preliminary data analyses reveal that the two vocal qualities can be differentiated based on acoustic parameters such as duration measures, and statistical analyses using SPSS are ongoing.

Social Science/Humanities

Poster Number 104: Allie Dellinger

Linguistic Evaluation by Learners of Spanish-WILKE Student

WILKE Student

This project examines linguistic cues, such as intensifiers, used by non-native speakers of Spanish during an immersion program. Intensiï¬ ers, like â€˜reallyâ€™ and â€˜veryâ€™, are â€œlinguistic devices that boost the meaning of a property upwards from an assumed normâ€ (Quirk et al. 1985). Additionally, intensifiers have been associated with gender, in that women tend to use more intensifiers than men (Lakoff 1975, Leaper and Robnett 2011, Sardabi and Afghari 2011). The goal is to examine how non-native speaking populations evaluate their surroundings using intensifiers during their experience.

Interviews with 36 English-speaking learners of Spanish at the beginning and end of a six-week program in Spain were analyzed. The 72 interviews were recorded, transcribed (180,000 words), and coded. Pre- and post-program data were analyzed quantitatively and qualitatively, in response to two research questions:

RQ1   Are there male and female differences for non-native speaking populations?

RQ2   Is there a change in intensifiers over time within the male and female non-native speaking populations?

Social Science/Humanities

Poster Number 106: Madison Fansher

The effects of aging and Parkinson's disease on trial-by-trial switching between categorization systems

The multiple systems framework of category learning through different procedural and declarative memory systems has received substantial support from previous research. However, a paucity of empirical work has studied the interaction between these categorization systems. Prior research has demonstrated that trial-by-trial system switching is possible for young adults, but no work has examined the effects of cognitive declines associated with aging or Parkinsonâ€™s disease on system switching. The neurochemical changes and treatments associated with Parkinsonâ€™s disease lead to cognitive deficits that may interrupt feedback-mediated learning essential for implicit and explicit rule learning about category membership, which may affect the ability to switch between category systems. We examined the effects of aging and Parkinsonâ€™s disease on trial-by-trial system switching by comparing the performances of young adults, older adults, and people with Parkinsonâ€™s disease on a categorization task. The results show that trial-by-trial system switching is possible for older adults and people with Parkinsonâ€™s disease. However, the natural aging process negatively affects the likelihood of being able to switch between categorization systems. This negative effect is particularly prominent in older adults with Parkinsonâ€™s disease as reflected by trial-by-trial switch cost for both accuracy and reaction time, as well as the cost associated with a change in the location of the response buttons. Future research is necessary to further examine

the mechanisms behind system switching and why it is impaired in older adults and people with Parkinson's disease.

Social Science/Humanities

Poster Number 107: Samantha Freiberg

Children with ADHD display less overactivity in the presence of animals compared to toys

Many of the current intervention techniques used for overactivity in Attention Deficit Hyperactive Disorder (ADHD) include pharmacological treatments or behavioral therapy. This study looks to examine whether a novel intervention technique, the presence and interaction with dogs, will play a role in the amount of overactivity observed in children diagnosed with ADHD. Animals have been found to lower stress and increase happiness and self-esteem, so we hypothesize that interacting with live animals will decrease the amount of overactivity displayed in children with ADHD. Thirty-six children between the ages of 7 and 9 participated in group Cognitive Behavioral Therapy (CBT) sessions and were randomly assigned to two different conditions, either animal or toy dog, which were present during all of the sessions. Activities during CBT for both conditions included writing in journals, reading books to a group, and learning coping mechanisms. All sessions were video-recorded and three minutes from each session were randomly selected for behavior coding. In total, 328 minutes of recorded video were behaviorally coded using the Observation of Human-Animal Interaction for Research â€" Version 3 (OHAIRE-V3) Coding System. Findings suggested that the presence of dogs was negatively associated with overactivity. The findings lend support to the hypothesis that the presence of dogs may have a positive effect on helping to regulate overactivity in children with ADHD.

Social Science/Humanities

Poster Number 108: Hannah Gallion

Climate Chnage and Health Effects in Indiana

Climate change is impacting human health and will continue to do so. Increased atmospheric release of greenhouse gases causes an increase in average global temperature, which is predicted to lead to increased extreme weather, heat waves, and air pollutants. These changes, in turn, affect human health; however, the extent and impact of these impacts is still unclear.

Therefore, this project comprised a review of the current evidence of how climate change has and will continue to affect human health. Peer-reviewed articles were identified using Google scholar, Pubmed, and Web of Science, using the keywords â€œclimate change and human health.â€ The search was then revised to focus on the United States, cardiovascular disease and respiratory diseases. Thirty-nine articles were analyzed and organized into four areas: heat stress (18), air pollution (15), infectious diseases (9), and extreme weather events (8). Some articles were placed into more than one category, while others that focused on prevention methods did not fall into any category. 94% of heat stress articles showed that increased heat led to increased mortality. 93% of articles showed that increased ozone, particulate matter (PM), and allergens are correlated with increased temperature. Increases in these pollutants are linked with an increase in respiratory problems. Infectious diseases, such as vector-borne, waterborne, and tick-borne illnesses including malaria, cholera, and West Nile Virus, are becoming more prevalent with increasing temperatures. 100% of articles showed that as temperature rises, disease pathogens are able to survive in more environments and stagnant water from natural disasters cause an increase in water-borne pathogens. 87.5% showed that extreme weather events, such as hurricanes and floods, are also becoming more frequent; this can lead to infrastructure damage, injuries, and stress. The next step will be to describe how these factors may impact Indiana residents.

Social Science/Humanities

Poster Number 110: Julianne Heyde, Samantha McLeish

He Said, She Said: Physical Activity Interactions of Older Spouses

Regular physical activity (PA) is associated with reduced risks of chronic diseases and all-cause mortality. Despite these health benefits, less than 5% of older adults meet PA guidelines. Increases in PA are associated with health-related support from oneâ€™s spouse; however, spousal control can interfere with PA. The extent to which married partners engage in these health-related interactions to promote PA and their agreement about these behaviors has received little attention. Using baseline data from a couple-focused intervention to increase PA (n=31 couples), we examined husbandsâ€™ and wivesâ€™ reports of providing support and control (i.e., persuasion, and pressure) related to PA to their partner as well as their reports of receiving each type of interaction. Nearly all participants (97% of husbands and wives) reported providing PA support during the past month. In contrast, only 32% of wives and 29% of husbands reported providing PA pressure. For PA persuasion, most (71% of wives and 81% of husbands) reported providing persuasion in the past month. For exchanges of PA support and PA pressure, each partnerâ€™s report of receiving PA support (and pressure) was associated with the others report of providing support (and pressure) (p<0.10). For exchanges of PA persuasion only husbandâ€™s report of receiving PA persuasion was associated with wives

report of providing (p<0.001). Spousesâ€™ efforts to promote PA may not be recognized by their partner, or may not be perceived as helpful. Future research should investigate interactions that convey effective support and avoid controlling exchanges that may interfere with PA.

Social Science/Humanities

Poster Number 111: Brendan Jameyfield, Kelly Dalheim, Demi Robinson, Anne Nanninga, Shi Han Zhang

The Stability of Parent-Reported Sleep Problems from 18 to 36 Months of Age

Parent-reported sleep problems are common and in most clinical settings, parent-reports are the only sleep information collected at well exams. Understanding the stability of these reports can inform clinical recommendations and aid in interpreting and treating these concerns. One-hundred families reported on their childâ€™s sleep problems using the Child Behavior Checklist (CBCL). Data were calculated when children were 18, 24, 30, and 36 months of age. Parent-endorsed sleep problems ranged from 0 to 11 with most parents reporting relatively few concerns, at each age.
When considering the entire sample, within-subject sleep problem/behavior stability declined across development, as indexed by intraclass correlations (ICCs) of .71, .65, and .44 from 18 to 36 months of age. However, stability patterns differed by child sex. Male children (n = 63) followed the pattern above with less stability from 18 to 36 months. However, female children (n = 37) showed relatively stable sleep problems/behaviors with age (ICCs = .87, .67, .78). There was a slight increase in parent-reported sleep problem/behaviors from 18 to 24 months, F(1, 71) = 6.10, p < .05, but average scores from 24 to 30 and 30 to 36 months were stable. When considering the stability of early childhood sleep problem/behaviors, child sex should be considered. Parent-reported sleep problem/behaviors were comparable regardless of child sex. However, these problems were more likely to persist in female children. Few studies address sleep problems repeatedly in young children. Our study is consistent with studies in older children with persistent sleep problems.

Social Science/Humanities

Poster Number 112: Abigael Johnson

AlemÃ¡n and Cervantes: Story Versus Argument

Professor Mancing has written extensively on the subject of Miguel de Cervantes, author of the famous novel "Don Quijote," occasionally in comparison to his literary contemporary Mateo AlemÃ¡n. I undertook a review of existing scholarship on both men separately, as well as Dr. Mancing's previous manuscripts and commentary on the matter, and prepared the foundation for an exhaustive future publication. By identifying the main points of debate, I was able to

synthesize a comprehensive survey of the issue, Alemán versus Cervantes, and provide a conclusive summary thereof.

Social Science/Humanities

Poster Number 113: Michaella Jones

Contentious Interactions: The Implications of Communication Deficits with Chronic Pain Patients

Although addiction is ultimately the responsibility of the individual, the medical profession is supposed to strive to give all patients equal access and care, which includes education of opioids. Medical Doctors are crucial in the decision-making process of their patients, being a key component of opioid prescription and supervision. Research suggests that of the millions of people addicted to opioids, most of them were first prescribed opioids for legitimate reasons. This research focuses on doctor-patient interactions, looking at the types of communication that physicians use to describe, explain and assess opioids. What we have found is that many doctors are missing crucial opportunities to prevent the overprescription of opioids. We are finding that doctors are missing signs of addiction, are not considering other options to opioids, and lack the discussion of future plans of pain management. Since most patients do not intend to misuse their prescriptions, it is important to address all issues and implications of prescription pain medication when first given, as well as throughout the entire course of consumption. Future implications could include the possibility of doctor-focused workshops on effective communication, a change in how prescription drug addicts are viewed at a societal level, as well as a more careful approach to the prescription of opioids.

Social Science/Humanities

Poster Number 114: Jonica Kao

Assessing the Relationship Between Sleep Duration, Screen Time, and Risk for Obesity in Midwestern Latino Adolescents

Obesity rates among American youth have doubled within the past three decades, indicating a public health concern. The childhood obesity rate is 17.7% compared to 26.1% for 6-11 year old Latino youth. Sleep duration and screen time have been implicated in the risk for obesity development. Current evidence indicates that insufficient sleep negatively influences metabolic and hormonal balance, thereby increasing obesity risk. There is also a positive association between screen time and weight gain. While decreased sleep duration and increased screen time are shown to augment obesity risk in other populations, there have been few studies

assessing both factors among Latino adolescents. The relationship between sleep duration, screen time, and obesity prevalence was examined among a sample of 119 Midwestern Latino youth in this cross-sectional study. Body Mass Index (BMI) was calculated from objective height and weight measurements. Measures of sleep duration and screen time were gathered by survey. Approximately 60.5% of Latino adolescents were classified as overweight or obese (20.2% and 40.3%, respectively). No significant differences were found for sleep duration during the weekdays and the weekends. Obese adolescents reported significantly less screen time during the weekdays compared to their non-obese adolescent counterparts (mean±SD; Obese: 1.7±1.3, Non-obese: 2.3±1.9; $p<0.05$). However, no significant differences in screen time were found on the weekends. These results show that increased screen time is not associated with obesity in this sample. Future efforts should aim to identify other potential risk factors in order to address the growing epidemic in this minority population.

Social Science/Humanities

Poster Number 117: Yizhu Liao

Creating the Authentic Chinese Hotel Experience: A Case study of the SCHOTEL brand

Introduction
After an initial period of consumer preference for foreign brands, China is seeing growing demand for local brands. This is evident in the hotel sector where, after a period of growth in foreign brands, demand for hotels that reflect Chinese heritage and culture is growing. Chinese hoteliers are challenged to determine the best strategies to incorporate Chinese cultural elements to the hotel experience while maintaining perceptions of authenticity. In implementing these strategies, Chinese hoteliers must determine if adding these elements creates customer loyalty and creates competitive advantage.
Methods
To answer the research questions posed above, the research will use a qualitative case study approach. Case studies are â€œintensive analyses and descriptions of a single unit or system bounded by space and timeâ€ (Hancock, 2011). Through a case study, the current researchers expect to gain a deep understanding of situations for Chinese-style hotels in the current hospitality industry as well as implications for adding Chinese elements into hotels. This case study will use mixed methods approach to explore the research questions from a variety of perspectives. A document review and content analysis of Schotelâ€™s website is the first element of the case study. Second, semi-structured interviews will be conducted with executives from SCHOTEL. Interviews will be recorded in Chinese and translated into English for thematic analysis.

This case study focuses on the hotel brand, SCHOTEL. Established in 2003, SCHOTEL is a new and famous Chinese-style hotel in China. The Chinese name of SCHOTEL is â€œShu Xiangâ€ which means the pleasant smell of a book. Based on traditional Chinese culture, SCHOTEL incorporates authentic Chinese elements into the hotel and delivers guests an exceptional Chinese experience.

Results/Discussion/Implication
This research explores the possibility of applying traditional Chinese cultural elements to boutique hotel culture in China. B

Social Science/Humanities

Poster Number 118: Carrie Littlejohn, Sara Metcalf

The Grammatical Use of Spatial Axes in American Sign Language

American Sign Language (ASL) is a natural human language that uses the hands, face, and body to convey information, unlike spoken languages that use the speech mechanism. This study seeks the patterns in the use of space in ASL that are connected to quantification. We analyzed video data collected from a native signer of ASL interpreting English sentences related to quantification(counting items and events) in order to observe how space was used. We found that there are three axes where these countable nouns and verbs are placed. The three axes are horizontal, vertical, and deictic (moving away from the body). The horizontal axis involved cardinal numbers (counting),they are signed from left to right for a right-handed individual in front of their body.The vertical axis displayed from top to bottom lists of numbers or objects as well as ordinal numbers (1st, 2nd, 3rd). The deictic dealt with infinite or unbound numbers. This included signed verbs that did not have an end point.Sign placement along different spatial axes has grammatical meaning in ASL.

Social Science/Humanities

Poster Number 119: Pfanqing Liu

Appeal For Justice: Human Rights Documentation

The project that is aimed at coding documents from Amnesty International, for research as well as eventual inclusion in an e-collection to be housed at Purdue.

Social Science/Humanities

Poster Number 121: Amanda Mueller

The Purdue S-SH (PUSSH) Test for Frequency Lowered Speech

A speech perception test, the Purdue /s/-/Êƒ/ (PUSSH) Test, was developed to help researchers and clinicians evaluate the likelihood of confusion between /s/ and /Êƒ/ for different frequency-lowering methods and settings in hearing aids. The test consists of 66 minimal word pairs differing only in the /s/ or /Êƒ/ sound in the initial, medial, or final word position. Six female

talkers were recorded, yielding 792 unique stimuli. Results are reported for different nonlinear frequency compression settings and low-pass filtered conditions.

Social Science/Humanities

Poster Number 125: Megan Pentecost

Nonmanual Marker Distribution in Classifiers of American Sign Language

In this study on American Sign Language (ASL), we will characterize the distribution of nonmanual markers, mouth shapes that accompany signs, with respect to classifiers, a type of sign in which the hand shape depends on the object being described. We will focus on extension classifiers which serve to describe the physical properties of an object or its location in space. For example, one may sign FLOOR with an extension classifier that describes it as wrinkled using a flat hand facing palm down that moves in a wavy pattern along a path. We will examine and continue annotating previously recorded video files using a program called ELAN typically used for the analysis of sign languages. We hypothesize that mouth shapes and changes in them will correlate with certain hand shapes or movements of the respective classifiers. For example, there may be a relationship between pushed out lips and a flat open palm. We are led to examine this based on the Visibility Hypothesis (Wilbur, Malaia, Shay, 2012) which states that sign languages convey scalar boundaries of a sign, such as a maximum or minimum, using predictable phonology, or specific features of a sign. Because of these observations set forth, we expect to find a similar mapping in classifier usage.

Social Science/Humanities

Poster Number 128: Sydney Rivera, Gabrielle Wise

Understanding Knowledge, Attitudes, and Behavior Determinants for Reproductive Health Care Decision-Making among Reproductive-Aged Women Living in Italy

Background: Studies have examined opinions, attitudes, and behaviors regarding contraceptive use in the Italian population. Italy stands out in comparison to other European countries and the United States for unique views and practices regarding contraception and reproductive healthcare access. However, the role of psychological, clinical, and behavioral factors in broader reproductive health care decision-making among women living in Italy remains unclear.
Objective: This study aimed to gather expert insight into currently unmet and perceived women's reproductive and sexual health needs in Italy.
Method: Researchers utilized a case study approach, which included document analysis, field observations, and semi-structured interviews with clinicians and practitioners living in Florence, Italy. Interviews were audio recorded and transcribed verbatim, and a constant comparative method of data analysis was completed in HyperRESEARCH 3.7.2.

Results: Resulting themes included 1) timing of entry into care; 2) healthcare accessibility and diversity; 3) the role of policy, culture, and community; and 4) a lifestyle approach to reproductive health. This information provides insight on how to deliver women's health services in an effective, organized, and formalized manner.

Discussion: Findings provide practical recommendations for Italy-based health professionals to further develop effective health messaging interventions to reach underserved populations, in order to reduce health disparities, particularly for women in regards to sexual and reproductive health. Results can also be used to compare and contrast women's health care behaviors and outcomes between countries, such as Italy and the United States.

Social Science/Humanities

Poster Number 129: Demi Robinson, Brendan Jameyfield

Using Eye-Tracking Technology to Index Eye Contact Modulation or Competence within On-going Social Interactions

Poorly modulated eye contact is an early behavioral risk marker for autism, and eye-tracking technology is often used to assess how individuals look at facial stimuli. However, we know relatively little about how these behaviors relate to in-person social interactions. We aim to assess the associations between eye-tracking, as indexed by eye contact with (1) later developmental concerns and (2) eye-contact modulation/competence within on-going social interactions.

Twenty-one infant siblings of children with autism (high-risk; n = 12) or typical development (low-risk; n = 9) completed an eye-tracking task and the Early Social Communication Scales (ESCS) at 18 months. The coded stimuli included three trials with emotional expressions wherein infants' fixations to the speaker's eyes were assessed. For the ESCS, initiations of joint attention (IJA) were totaled for frequencies of lower-level, higher-level, and overall bids. Due to the limited sample size, outcome was dichotomized into typical (TYP; n = 11) and non-typical (Non-TYP; n = 10) development.

Overall, the high-risk group spent significantly less time looking to speaker's eyes during the happy trials. The Non-TYP group spent less time attending to speaker's eyes during the neutral trials. Additionally, Non-TYP IJA scores were positively correlated with time spent looking to speaker's eyes during happy and sad trials and looking to the speaker's mouth during neutral trials. These findings demonstrate that (even in small samples) time spent looking to eyes can serve as a risk marker of later developmental concerns in children at elevated risk for autism.

Social Science/Humanities

Poster Number 130: Tara Seibert, Ellen Woon

Effect of Trauma and Social Isolation on Discriminatory Behaviors in Adolescent Male Rats

Adolescents exposed to traumatic life events are more likely to experience psychological health problems, such as Post-Traumatic Stress Disorder (PTSD) (Bougard et. al, 2016). Our lab has shown that prior trauma decreases reward seeking and impairs fear regulation in adult male rats. Here, we tested the hypothesis that adolescent trauma + social isolation will impair adult safety-fear-reward cue discrimination. To test this hypothesis P21 male Long Evans rats were either single-housed or group-housed (3/cage). At P28 rats were either exposed to an acute trauma consisting of 15 unsignaled 1.0mA footshocks in context A or the control condition, exposure to context A without footshocks. At P77, all rats received discriminative conditioning (DC), in which they were trained to discriminate among a) a fear cue paired with a 0.45mA footshock, b) a safety cue in the presence of the fear cue resulting in no footshock, and c) a reward cue paired with sucrose delivery. Following DC, all rats underwent fear and reward extinction. Preliminary data indicate that single-housed rats that experienced adolescent trauma show, in adulthood, 1) decreased reward seeking, 2) impaired ability to discriminate between fear and safety cues, and 3) impaired fear extinction. These data indicate adolescent stress influences future learning of safety, fear, and reward cues in adulthood.

Social Science/Humanities

Poster Number 132: Emma Stricker

The presence of dogs promotes verbal communication in children with Autism

Animal-assisted intervention has been introduced as a possible adjunct therapy treatment for Autism Spectrum Disorder (ASD). Some of the core symptoms of ASD include language impairment and deficits in communication. In this study, we compared the occurrence of verbal communication in children with ASD in the presence of dogs (experimental group) or toys (control group). I hypothesized that children would show a higher occurrence of verbal communication in the presence of dogs compared to toys. Participants were 47 children and adolescents with ASD. At the Children's Hospital Colorado, children participated in unstructured activities with either a therapy dog or a marble track toy for 10 minutes. Sessions were video recorded for later behavioral coding. After randomly selecting three separate one minute sections of video, I coded participants' behavior in every video using the Observation of Human-Animal Interaction for Research (OHAIRE) coding tool. For our purpose, talking is defined as verbal communication towards a target (adult, peer, dog, or toy). The same children participated in each group, so the data analyses were run with paired-samples t-tests. Our preliminary results indicate that children talked more in general in the dog session compared to the toy session (t = 1.985, p = 0.052). The preliminary results confirmed my initial hypothesis and matched findings from previous studies. Our results suggest that therapy dogs

could be used to encourage and help children with ASD verbally communicate, and may be possible to apply to other developmental disorders.

Social Science/Humanities

Poster Number 135: Andrea Walden, Madeline Kasper

Embedded and Matrix Verb Phrases in American Sign Language

Our poster will consist of the factors that affect verbs in embedded clauses compared to main verbs in American Sign Language. Most spoken languages that have been studied have found evidence of the differences between embedded and matrix verbs, but we still have not found significant data for sign language. The main differences have been observed in the duration of the matrix and embedded verb, their signing spaces, location in signing space, evidence of finite or nonfinite clauses, and the addition of functional adverbs like FINISH. We will be using several methods to find significant data. As of now, we are analyzing approximately forty to fifty phrases and recording the duration of verbs (matrix and embedded), location of the dominant signing space, duration of adverbials, and embedded clauses with finite, non-finite or aspect. We have not had a conclusive answer to our research question based on the data. Our goal between now and the symposium is to discover the degree to which these previously stated factors are dependable sources. We hope to uses these factors to help identify and describe embedded clauses compared to their matrix counterpart.

Innovative Technology/Entrepreneurship/Design

Poster Number 144: Emma Birkey

Sustainable Multifamily Housing

Due to the current economic constraints, a denser housing type in a livable community (e.g., multifamily housing) has become a sustainable option for some households because of environmental benefits, such as reduced-housing size, smaller land use, and easy access to public services. Increasing number of multifamily housing communities receive energy-saving certification such as LEED and emphasize their green design features. The aim of this study is to identify specific green design features that recently built multifamily housing communities promote on their websites.

Innovative Technology/Entrepreneurship/Design

Poster Number 163: Sherin Khawaja

Sustainability incentives in different states for single family homes.

The aim of this research is to get an understanding of what refulations and incentives exist in different states regarding the sustainable design of single family homes. By looking at this, we aim to find what states are doing well in terms of sustainable living, and what states need to better address the issue of lack of sustainable design in housing. We will also be able to find what incentives work and encourage people to make their homes more sustainable, as well as how we can make sustainable home designs more popular/in demand/common.

Innovative Technology/Entrepreneurship/Design

Poster Number 176: John Rapes

Statistical Analysis in Zooarcheaology using R

This project creates a user interface for the programming language R. With this interface zooarcheaologists, among others, will be able to conduct statistical calculations using R. This will make create an easy method for academics that are not familiar with programming but still wish to use statistics to further their research.

College of Liberal Arts

Life Science

Poster Number 151: Samantha Diefenbacher

Visual Anthropology of Native American Societies

The way in which Europeans and Euroamericans have depicted Native Americans in a variety of art forms (drawings, paintings, photographs, and film), starting in the late 15th century up to the present day, have both reflected and influenced the way in which North American Settler society has thought of and treated Native North Americans. Using books and previously collected digital images students will investigate the history of how Europeans and Euroamericans have depicted Native Americans in a variety of art forms for a specific time period (to be decided) during the last 500 years.

Poster Number 178: Cassandra Salazar

http://discoverypark.itap.purdue.edu/learningcenter/mkwuri/projects/view.cfm?ProjectID=1349

Spanish-English bilingual children are one of the largest growing populations in Indiana and the US as a whole. This project looks at the language production of children who have acquired Spanish at home and become exposed to English at a later age (3-to-5 year olds or older). This research is part of a larger project that examines how children manage to acquire more than one language with ease and embeds itself within the activities of the Indigenous and Endangered Languages Lab (IELLab). The two sides of the research project are (i) how English is acquired and (ii) how Spanish can be maintained (Spanish as a heritage language in the US tends to get lost as English becomes dominant). We collect spontaneous speech production of children in their two languages. We look at how they acquire their new language (English) and how they maintain their home/ heritage language (Spanish). In particular, we look at their production of questions and the syntactic phenomena involved (wh-movement and verb- and auxiliary-related operations). We may also collect data through a game with puppets. The child is video-recorded interacting with an adult (or other children) in the language they usually share. Then we transfer the recording to a computer and transcribe the data. We then code the productions for linguistic properties. We follow the children's production to see how they shape and modify their grammars. We look specifically at their 'errors' (non-target productions) and use them as indicators to follow their progress in shaping the grammar of their languages.

Social Science/Humanities

Poster Number 140: Joseph Aiello

Transforming Anthropology Education and Practice

Social Science/Humanities

Poster Number 141: Gary Alexander

The Rhetoric of Archives

the intern will assist me in working with archival collections at the Tippecanoe County Historical Association, writing descriptions of those collections, digitizing some collections, and using those collections to theorize scholarly engagements with archives. The intern will also assist me in completing a manuscript on the rhetoric of archives, which would include helping identify or

cite sources, working on digital displays of data, and providing feedback on clarity and concision for an undergraduate audience.

Social Science/Humanities

Poster Number 142: Paige Annee

Creating Moments of Joy - Creation and Execution of a Public Relations Strategy

This project provides strategic public relations support and counsel to the Purdue University Press. Based on previous framework, the student will work to re-brand social media platforms, create media kits, and supply lists of book reviewers to promote the newly released, fifth edition of "Creating Moments of Joy along the Alzheimer's Journey: A Guide for Families and Caregivers" by Jolene Brackey. Through its 20 years of circulation, the book has generated $1 million in sales, the most revenue that a book by the Purdue University Press has ever generated. The goal of the internship is to provide reliable and successful public relations tactics to promote its new release, measured through increased social media followers, an increased amount of book reviews, and increased media presence.

Social Science/Humanities

Poster Number 143: Delaney Barber

Morphological model of Wolf Tooth Scores

The addition of meat into the hominid diet was a keystone benchmark in the evolution of the genus Homo (Aiello et al, 1995). Cutmarks on fossil prey animals' bones are some of the best trace evidence of meat-eating and stone tool use by hominds (Pante et al, 2016). However, scientists disagree about the timing that hominids began to use stone tools as butchery implements (Keeley et al 1981)(McPherron et al, 2010). Lack of confidence in the identification of butchery marks on fossil and sub-fossil bone is a major problem. This is likely because assessment of cutmark morphology is currently subjective (Pobiner, 2008). No objective statistical methods are in use for discriminating the 3D morphology of marks on bone, especially between cut marks and carnivore tooth scores. To bridge this knowledge gap, this study proposes to use 3D morphometrics and statistical techniques to distinguish between experimentally derived cutmarks and carnivore tooth scores.

Poster Number 145: Catherine Carstens

Feminism in Russia: Confronting a Gendered Regime

The dynamics between women's movements and the state have been studied extensively by scholars of social movements. The purpose of my research is to examine the dynamic between social movements and the state in a context of repression by focusing on the frames deployed by the women's movement and the counter frames deployed by the satte. I focus on the case of Russia - the frames deployed by the Russian feminist movement and the counter-frames deployed by the state in response. I will examine the specific frames that are deployed and the plausible reasons and rationale for use of these frames. I explore the successes and setbacks of the Russian feminist movement I use secondary sources of information to analyze the frames.

Social Science/Humanities

Poster Number 146: Rebekah Cho, Nadia Arzberger

Korean-English Multilingual Acquisition

The goal of this project is to continue the research of Sung Park-Johnson studying the role of crosslinguistic influence in the acquisition of certain language features in bilingual Korean-English speaking children. The focus is primarily on wh-questions and tense movement within sentences. This study will help us understand more about how the acquisition of two languages simultaneously affects each other, see if it is comparable to the bilingual acquisition of other languages (Spanish-English and Chinese-English specifically are also studied in the Indigenous and Endangered Languages Lab), and find use for its application in early language learning.

Social Science/Humanities

Poster Number 147: Christina Clase, Melissa Deach

Increasing Partisanship in the United States and Potential Causes

The United States political divide is a pervasive issue right now, and our research sought to eliminate some of the ambiguity surrounding where this divide stems from. Previous research suggests that political partisans, or individuals active in politics hold drastic, increasingly partisan beliefs regarding solutions to the issues facing America. Why middle ground is becoming harder to obtain though remains unclear. We believed that media, such as large news networks, were in large part responsible for the increasingly divided nature of individual's political beliefs. To evaluate this premise, we conducted on the ground interviews of political elites, protestors, and every day Americans during Inauguration Weekend

at events such as the Inauguration, Women's March, and various other venues we had access to. Our research, while far from a comprehensive evaluation of the entire United States, suggests that many believe the media does play a role in shaping increasingly partisan views. Whether the media creates the divide, or simply perpetuates an already existing one remains unclear though.

Social Science/Humanities

Poster Number 148: Emily Cunningham

Emotional Labor in Dangerous Professions

People in the military, Department of National Resources, coal mining, the first department, and the police department all work in dangerous professions. The purpose of the research is to determine how people in these professions cope with traumatic experiences in their work. Bravery and humor are the key aspects evaluated when looking into dangerous professions.

Social Science/Humanities

Poster Number 149: Patrick Cunningham

The Criminological Consequences of Undocumented Immigration.

Despite substantial public, political, and scholarly attention to the issue of immigration and crime, we know relatively little about the criminological consequences of undocumented immigration. As a result, fundamental questions about whether undocumented immigration increases crime remain unanswered. Attempting to address this gap, this project will combine newly developed estimates of the unauthorized population with multiple data sources to capture the criminal, socioeconomic, and demographic context of all 50 states and Washington DC from 1990 to 2014 to provide the first comprehensive empirical analysis of the macro-level relationship between undocumented immigration, crime, and substance abuse.

Social Science/Humanities

Poster Number 150: Bridget Curry

High Expectations and High School Choice

As Purdue University moves forward with its newest educational endeavor, the Purdue Polytechnic Indianapolis High School, opening in August 2017, few have mentioned that investing in college preparation is not new to this university. In the late 1800s, Purdue's Preparatory Department served as an educational equalizer during a time when there were no standards for primary education. My research recovers the archival history of the Preparatory

Department and examines similarities to its contemporary counterpart, highlighting the importance of remembering our past in order to better predict the future of the Polytechnic High School and the student experience today.

Social Science/Humanities

Poster Number 152: Sara Dunco

The Experience of Interpersonal Connection in Fast-Paced Collaborative Games

Greene and Herbers (2011) developed the â€œtheory of transcendent interactionsâ€ (TTI) to address experiences of maximal engagement in an interaction that are characterized by mutually driven ideation and a sense of exploration and discovery.

An experimental paradigm for approximating the experience of interpersonal transcendence in a laboratory setting has been employed in previous studies. This study continues in that vein. The experimental protocol involves a simple matching game in which a â€œsenderâ€ is given a deck of cards, each bearing a difficult-to-label or describe image (photographs and illustrations taken from technical and scientific publications). A â€œreceiver,â€ with an identical set of cards, has the task of matching the card image being described by his or her partner, and to do so as quickly as possible on each trial.

TTI specifies a number of situational, relational, and individual-difference factors that should play a role in the experience of interpersonal transcendence. The aim of the current study is to examine the potential impact of dispositional affective orientations on such experiences â€" the primary research question being â€œdo dispositional affective orientations play a role in transcendent experiences?â€ Measures of dispositional affect will be: (1) the Affective Communication Test (Friedman, Prince, Riggio, & DiMatteo, 1980), (2) the Affect Intensity Scale (short form) (Geuens & Pelsmacker, 2002), and (3) the Positive and Negative Affect Schedule (Crawford & Henry, 2004).

Social Science/Humanities

Poster Number 153: Alejandra DurÃ¡n Trinidad

Public Relations Strategic Planning - Purdue Aviation Day

This project involves strategic public relations support and counsel to the Purdue Polytechnic Instituteâ€™s Aviation and Transportation Technology Department for the 2017 Aviation Day. This project will be completed under the guidance of Professor Kim Osborne, who is the C-SPAN Chair Professional-in-Residence in Purdue's Brian Lamb School of Communication and a PR strategist with more than 20 years of industry experience. For this project, I will work with Dr. Osborne and leaders in the Aviation Department to create a communication plan to promote 2017 Aviation Day. This will be only the third Purdue Aviation Day event in the past 106 years at Purdue. Last yearâ€™s event was sponsored by Republic Airways, Rolls Royce, PSA Airlines,

SkyWest and others. Attendees can fly in, drive in or even walk in to celebrate the past, present and future of Purdue aviation and the School of Aviation and Transportation Technology. I will be responsible for defining the project outcomes, which will be to increase the success of the event over past years. I will create a strategic communications plan, establish measures of success, execute the plan to include media relations, social media, VIP management as needed, and reporting on the effects of the plan toward increasing the attendance at the event. I will also support Dr. Osborne in the development and delivery of counsel to the event planners at Purdue Polytechnic Institute, including attendance at planning meetings. Finally, I will be expected to research and provide recommendations in response to anticipated and unanticipated proceedings.

Social Science/Humanities

Poster Number 154: Emily Dye

Messages About Gender Equality In a Democratic South Africa

This research investigates how laws mandating gender equality influence women's everyday lives in practice. Using post-apartheid South Africa as a case study, this project examines whether the legislative changes mandating gender equality passed since the democratic transition in 1994 have translated into greater empowerment for women in relationships, families, and society writ large. The end of apartheid in South Africa in 1994 brought sweeping changes to virtually all aspects of society by ushering in a host of political, economic, and legal changes instituting, among other things, racial and gender equality. The legislative and structural changes in support of gender equality provided official legitimacy to women taking on more active roles in society and supplemented their ongoing efforts to increase their social position relative to men. The expectation was that structural changes such as gender equality in employment and wages, legal protections against domestic violence and marital rape, and government and civil commitments to the advancement and empowerment of women would aid in altering cultural practices that traditionally disempowered women relative to men. Nonetheless, we lack information about the extent to which women's everyday lives may have improved as a result of these structural changes. Moreover, little information exists about the types of messages about gender equality that circulate in South African society in everyday life. The research will involve collecting and analyzing messages that South Africans receive about gender equality and women's empowerment from various sources, including the government, news outlets, popular media, the health care sector, and online. Understanding the types of messages circulating about gender equality and women's empowerment in South African society is important for contextualizing why women still lag behind men on most indicators of health and well-being and for developing strategies for change.

Social Science/Humanities

Poster Number 155: Lauren Feagler, Michael Turnietti, Torrie Ward, Daniella Gonzalez, Courtney Pegues

Qualitative Analysis of Polarization in American Politics

The purpose of this research is to identify political polarization in America today, and more specifically whether or not the United States is experiencing a culture war. In order to reach any conclusions on this topic, we first read the book â€œCulture War: The Myth of a Polarized Americaâ€ by Morris P. Fiorina. In this book he declares that there is not culture war, and polarization is elevated due to the political elites in the U.S. After reading this book we traveled to Washington D.C. to interview political elites such as politicians, members of the senate budget committee, and the media, as well as the public, at the presidential inauguration and then the next day at the Womenâ€™s March on Washington. In these qualitative interviews we asked respondents to comment on polarization in America today and in this past election cycle, as well as other questions we generated relating to polarization in politics. After gathering the interview responses on the ground in D.C., we came to the general conclusion that among Americans there is a feeling of a â€œculture warâ€ , countering Fiorinaâ€™s arguments in the book. Generally, we found that people perceive the media as a negative influence in politics leading to more polarization. Also, there is a consensus from both parties that something must be done to change our political system, although very few people have concrete solutions to offer. This research helped us to understand the ideas in America today about the supposed culture war from a firsthand perspective.

Social Science/Humanities

Poster Number 156: Megan Ferguson

BRANCH & NAVSA

In a technological era, it is often necessary to use websites to bring together ideas from around the world. I am currently working with two organizations which focus on nineteenth-century studies. Both of these organizations would not have such an esteemed international presence without the assistance of technology. The first, the BRANCH (Britain, Representation, and Nineteenth-Century History) Collective, runs a website that compiles academic articles from across disciplines regarding nineteenth-century studies into one timeline for easy access. The second, NAVSA (North American Victorian Studies Association), is an organization that holds conferences and facilitates academic discussion of the Victorian Era. I assist with data entry for articles submitted to the BRANCH Collective as well as with NAVSA's blog and social media presence. These organizational and outreach mechanisms help each organization effectively reach their global audience.

Social Science/Humanities

Poster Number 157: Joel Frese

From Ferguson to France: Considering BlackLivesMatter in a Global Context

This project builds off of my existing research on race and immigration in France to explore the history of state-sponsored violence against racial and ethnic minorities in France as well as the resonance of BlackLivesMatter as a social movement in France. What are the reverberations of state-sponsored violence against blacks beyond the United States? How is BLM a global movement and not just an American one?

Social Science/Humanities

Poster Number 158: Samantha Guckenberger

Pacifists During WWI - Historical Legal Consciousness

President Woodrow Wilson campaigned on the promise that he would keep America out of what eventually was known as WWI. He changed his view of entry into the world war, as did much of the country. However, some people, specifically Victor L. Berger who was the senator of Wisconsin at the time, still objected to the U.S. entering into what was seen by some as a European conflict. This project uses historic analysis to examine newspaper articles and other documents from approximately 100 years ago to explore the legal consciousness of politicians, specifically Victor L. Berger, and members of the general public who opposed entry into WWI.

Social Science/Humanities

Poster Number 159: Madeleine Holmes

Recycling Behaviors Across Tight and Loose Cultures

Does the tightness (adherence to social norms) or looseness (less adherence to social norms) of a culture affect individuals' recycling behaviors or attitudes toward recycling? Influenced by Gelfand's work on tight and loose cultures, state-wise and nation-wise, this study sought to develop a survey that will assess participant's recycling behaviors and attitudes, as well as the collective attitude toward recycling in their home state. The survey will also assess whether participants' home states are considered tight or loose in terms of culture. Based on Gelfand's measure of tightness and looseness across the fifty states, as well as state recycling rates, it is

hypothesized that our survey will reveal that states with loose cultures are more likely to recycle than tight states.

Social Science/Humanities

Poster Number 160: Alec Jacobs

Modesty In Motion

How Black Muslim women express their identity through their dress.

Social Science/Humanities

Poster Number 161: Destiny Johnson, Joe Aiello

Preparing for the Future: The Development of Students' Interdisciplinary Abilities

How do we prepare students for work outside of Purdue? The world that Purdue graduates are entering is becoming increasingly interdisciplinary and requires us to work with people different from ourselves. But higher education, which focuses on discovering and teaching highly specialized knowledge, does not always foster an environment that is conducive to working across traditional disciplinary divides. This mixed methods project uses interviews, focus groups, and participant observation of students with diverse academic backgrounds in order to investigate two main areas of research.
The first area focuses on gaining first-hand accounts of students' experiences working on interdisciplinary, project-oriented teams. The second area focuses on understanding the spaces on-and-off-campus in which students do interdisciplinary and collaborative work.
We analyze how students interact with the interdisciplinary or "open" work spaces they have access to on-and-off campus in order to determine whether or not current instructional models and spaces are effective in promoting interdisciplinary collaborations among undergraduates. Our findings will inform the design of a new interdisciplinary engagement lab at Purdue that focuses on collaborative work between social sciences and STEM. This "Space for Practice" lab will connect students to a network of practitioners working outside academia and provide students with experience in collaborative interdisciplinary projects.

Social Science/Humanities

Poster Number 162: Nida Khan

Do words that exist in our language affect how we pronounce them?

Some words that exist in our languages have minimal counterparts — words that differ in one sound only, for example dusk-tusk. For such words, a possibility that the two may be confused

in the course of speech communication exists, especially if their acoustic realization lacks clarity. The question investigated in the present study is whether human speakers would in fact aim for a better acoustic realization of words that have minimal pairs, compared to the ones that donâ€™t, e.g. desk (there is no word tesk). In addition, we are asking whether this tendency extends to made-up words for example, when participants are asked to pronounce a word tesk, knowing that a minimal counterpart, desk, exists in the language. The acoustic material for this investigation has already been collected and being annotated and analyzed.

Social Science/Humanities

Poster Number 164: Sarah King

Human Rights Research Project

With Professor Clark, I will be researching human right cases of Amnesty International. She will show me how to use different programs to analyze documents and cases of international human rights cases. It will be further explained in the official abstract.

Social Science/Humanities

Poster Number 165: Allison Lansing

Social Media Persuasion Project

The project aims to create a persuasive typology for political tweets. We will analyze about 3000 tweets issued by the two 2016 presidential campaigns to determine if they followed a known typology of rhetorical appeals (forensic, deliberative, celebratory). We will also analyze the impact of the appeals to see if they increased public awareness of the candidateâ€™s stands or likelihood to vote for that candidate.

Poster Number 166: Christopher Lanza

Hunter-Gatherer IBM: Forager Face-off

Using Individual Based Modelling (IBM), a concept that has been applied to animal ecology, economics, political science and more, I was able to compare the foraging methods of hunter-gatherer groups in a randomly generated landscape. Each individual moves about the simulated environment collecting plants, fishing, and hunting with varying success based on their foraging habits. Individuals are born, grow old, and die or starve. After 5000 loops of the simulation a winner is determined by who has the most living members.

Social Science/Humanities

Poster Number 167: Claire Marsh

Supreme Court Decision Making

I am looking at what factors influence whether or not the U.S.Supreme Court upholds or overturns state supreme court decisions. The factors I am considering are differences in ideology between the U.S. and state Supreme Courts, the ideological mood of the country, the professionalism of state supreme courts, whether the U.S. Supreme Court justices are activist or restrained, and whether the U.S. is a party to the case. I have made hypotheses about how each of these factors influence the Supreme Court's decisions and I am testing those hypotheses using STATA.

Social Science/Humanities

Poster Number 168: Tess Marshall

Visual Anthropology of Native American Cultures

The way in which Europeans and Euroamericans have depicted Native Americans in a variety of art forms (drawings, paintings, photographs, and film), starting in the late 15th century up to the present day, have both reflected and influenced the way in which North American Settler society has thought of and treated Native North Americans. Using books and previously collected digital images students will investigate the history of how Europeans and Euroamericans have depicted Native Americans in a variety of art forms for a specific time period (to be decided) during the last 500 years.

Poster Number 169: Kathryn Math

Fang & Feather: the Origin of Avian-Serpent Imagery at Teotihuacan and Symbolic Interaction with Jaguar Iconography in Mesoamerica

The Central Mexican city of Teotihuacán rose to prominence in the last century BC and lasted for nearly six hundred years. The civic plan was arranged around two main perpendicular avenues. . Such intentionality and uniformity insinuates the presence of some sort of governing agent. Yet, even after decades of archeological research at the site, there is little consensus on what form of government that was. There are no stelae proclaiming the great achievements of ajaws (to borrow the Mayan term for ruler), no definitive palaces, no royal burials of the Classic Period. Instead, Teotihuacán murals tell a story by depicting ornately dressed administrators, armor-clad warriors, and fantastic creatures not found in nature.
These murals are key to this paper's subject matter as they were the birthplace of the Feathered Serpent. I propose that the Feathered Serpent of Teotihuacán was a new deity serving as a symbol of the city and was conceived in direct opposition to the jaguars used to symbolize kingship in contemporary Mayan polities. Past studies have treated the murals of Teotihuacán as either literal representation of supernatural deities—often equating it to Quetzalcoatl of the Aztec cosmos—or as a set of signs to be translated like a language. This study concludes that there is an intermediate interpretation wherein the feathered serpent is both a god and a symbol of identity. This is found in the representations of Teotihuacanos outside of Teotihuacán and outsiders within the barrios of Teotihuacán. I will show that Mesoamerican states not only foregrounded concepts of community identity, but also actively recognized those of other polities they came into contact with.

Poster Number 170: Caelum Mroczek, Cassandra Salazar

Spanish- English Multilingual Acquisition

In a continually globalizing world, multilingualism can be seen as becoming distinctly more pertinent. The goal of our research is to model how multiple mental grammars develop in multilingual children. Continuing from a basis of Park's (2011) PFAM-Hypothesis, we are looking at how the L1, in this case, Spanish, mediates the subsequent acquisition of English. In particular, we are targeting "wh- question" formation and "T-to-C" movement in Y/N questions. Spontaneous speech of Spanish-English speaking children (aged 7-9 and 11-14) has been collected, transcribed, and coded in order. Non-target productions demonstrate the effect of Spanish on the English productions in terms of V-to-T movement, do-support overgeneralization, and confusion of the Aspect feature in T. As children have the capability to

function with multiple fully-formed grammars, the interaction between these grammars is not fully understood. It has been seen that, if the grammars are acquired sequentially, there can be traces of L1 features in early stages of L2 development.

Social Science/Humanities

Poster Number 171: Sarah Nolan

Ishiguro and Bioethics

This study looks at the bioethical implications in Kazuo Ishiguro's Never Let Me Go, a novel in which clones have been ostracized from society and are used as spare parts for legal citizens in need of transplants. Fiction, and science fiction in particular, has long worked to flush out issues in morality concerning scientific progress. This study looks at the bioethical concerns inherent in cloning, but also questions the morality of using any persons, including the arguably animal person, as an ends rather than a valued entity. My research consists of reading criticism concerning Kazuo Ishiguro's fiction and contemporary literature concerning animals rights and clone, in an attempt to create conversation between the liberal arts and scientific studies. As of yet, this research has not yielded any specific results, but has instead generated a body of information from which my research supervisor can pull in the writing of her upcoming book chapter.

Social Science/Humanities

Poster Number 172: Kelly O' Keeffe, Piyushi Jaiswal

YouTube, Learning Communities, and Social Media

The purpose of the research is to gain a better understanding of how learning communities form on social media. Specifically, we are examining the comments section of "how to" music-focused tutorials on You-Tube. These comment sections will provide us with interactions between commenters on YouTube videos, demonstrating how communities form around specific YouTube channels or videos. Our method involves searching for 200 "popular" YouTube videos that focus on providing a music oriented "how to" tutorial. We will randomly select 100 videos to study more in depth and look specifically at user comments. In this way, we will study how commenters use YouTube, how commenters interact with one another, and how communities among YouTube users form in comment sections of videos. This process will not only give us a stronger understanding of how learning communities form specifically on YouTube, but also how communities form on social media sites in general.

Overall, this study will give us insight into human sociology and psychology while also allowing up to explore social media, education, and the arts.

Social Science/Humanities

Poster Number 173: Isabelle Ortt

Estimating Population Diversity and Turnover during the Miocene

Understanding underlying drivers of the ebb and flow in the diversity of life over time is a significant question in paleobiology. Fluctuations in diversity are caused most directly by dynamic between the number of species extinctions and originations. Inferring these values, however, is not a straightforward task. This is particularly the case when observing fossil remains, given that the paleobiological record is incomplete. Several sources of variation add unknown levels of noise or error to taxonomic counts at given time intervals. This error addition also applies to the range of occurrence of such taxa across time. Determining whether individual taxon are truly absent from a sample or missing due to some source of error is a significant problem. This project uses a Capture-Mark-Recapture (CMR) approach to estimate the degree of organism diversity change and turnover during the Miocene paleobiological record of Pakistan. (from Wilke website)

Social Science/Humanities

Poster Number 174: Jessica Peine

Beauty is in the Eye of the Stakeholder: Perception of Corporate Social Responsibility and Purchase Intention

The critical, yet difficult, conversation (at least for public relations professionals) is the influence of public relations activities on a purchase decision. Whereas not a traditional consideration of public relations scholarship, the contribution of public relations efforts to an organization's bottom-line is critically relevant to communication management, even if it is not the primary imperative of those efforts. One of the more complicated public relations contributions is corporate social responsibility (CSR), whereby an organization offers goodwill to improve society or even the well-being of the region in which it does business. An organization's CSR activities inevitably influence consumers' purchase decisions, whether that is the intention of such efforts or not.
Principally, corporate social responsibility, as a public relations activity, may be a question of public perception, and the purpose of this study is to consider this connection between CSR and consumer perception, from a public relations perspective. Results from this study's focus groups show that CSR is a complex concept, and that its beauty may be in the eye of the stakeholder. Findings show that perception of intention is critical, and that an extant organization-public relationship may also influence decision-making.

Poster Number 175: Xuan Qiu

Building a Better Major: What Students Want from a Communication Major

The Brian Lamb School of Communication is considering a significant revision of its undergraduate majors. The faculty and advisors have some ideas about improvements, but we also want to know how current and prospective students feel about possible changes. A series of focus groups (mostly with current students but one with students who will be entering in the fall) will allow students to have input into this revision process. These focus groups will ask about different areas or tracks within communication, changes in requirements for ALL communication majors, and what kinds of skills or credentials communication majors want or expect to gain before leaving Purdue.

Social Science/Humanities

Poster Number 177: Lucinda Ray

Pronunciation Instruction in L2 French

The "Pronunciation Instruction in L2 French" project is an ongoing research project investigating the effect of pronunciation instruction on advanced learners of French as a foreign language. It specifically emphasizes the production of the sound /p/ (reduction of word-initial aspiration) and the distinction between /u/ and /y/ vowel pronunciation. This is done by recording native English speakers learning French at the college level and analyzing the recordings using the phonetics software Praat.

Social Science/Humanities

Poster Number 179: Jessica Seamands

Elizabethan Era Theatre: Three Lords and Three Ladies of London

The Elizabethan Era was arguably the most splendid age in the history of English literature. It was a golden age for drama, a flourishing period for poetry, and a grand awakening for a variety of brilliant prose. Even more impressive than the wide array of literary works generated or revolutionized during the reign of Elizabeth I of England were the genius writers that created them: Sir Philip Sidney, Edmund Spenser, Roger Ascham, Richard Hooker, and Christopher Marlowe, just to name a few, all made names for themselves as masters of their craft. So why is it that the only name recognized in relation to this time period is Shakespeare? At first, my research for this project focused on Old English form and conventions for the modernization of Elizabethan literature. With that research complete, at least for now, I have started to personally transpose various elements of the original text including, but not limited to, spelling,

punctuation, syllabic variations based on rhyme or meter, contractions and elisions, capitalization, verb forms, and abbreviations. Once I have completed this process, I will assist my faculty advisor in addressing big-picture elements of the play such as costumes, music, and stage directions for the final version of the modern edition. The specific goal of my research is to complete a digital edition of the Elizabethan play, Three Lords and Three Ladies of London, to contribute to the online database known as Queen's Men Editions, a collaborative site created by an international body of scholars, theater practitioners, and digital developers. However, the overarching aim for this project is to inspire a love of early theatre beyond Shakespeare and to recover and present the plays associated with the Queen's Men in particular in a rich online environment.

Social Science/Humanities

Poster Number 180: Claire Sigworth

Bioarchaeological Education and Outreach in Sudan

This project, as a continuation of last year's public outreach, focused on creating educational materials for students in Sudan to learn about archaeology, skeletal and artifact analysis, ancient Nubian and Egyptian history, and the findings from the local Tombos site. The final products consisted of three 36x72" posters, in both Arabic and English, created using Adobe Illustrator and Photoshop. The first poster explains where Tombos is, and what the project goals are. It also details some of the archaeological findings at the Tombos site. The second poster gives a general overview of the field of archaeology, explaining some methods, tools, as well as how to help archaeologists. This poster consists of an interactive element as well, where the artifacts on the strata are placed with Velcro, allowing students to remove and place them. The third poster consists of a timeline of Nubian history, with blurbs about each time period. These posters were taken to Sudan during the 2017 excavation season, and were used in schools. Not only were these posters used to disseminate research during the most recent excavation season, but the Tombos WordPress website and blog created last year was maintained and updated throughout the season to showcase current findings.

Social Science/Humanities

Poster Number 181: Michael Simmons

Music, Magic, and Narration. From E. T. A. Hoffmann's fiction to Offenbach's opera.

E. T. A. Hoffmann described music as a magical thing, which takes the listener to a new world beyond the boundaries of reality. It makes sense, then, that music, and its accompanying magic,

proliferates throughout Hoffmann's literary works. Hoffmann often addresses the reader directly in his works using a meta-narrative, as if to remind the reader the world into which they delve is magical. In Offenbach's opera "The Tales of Hoffmann", Offenbach explores this connection between music, magic, and our material world with a narrative that honorably reflects the source material, heeding not just the magic of music, but also the framing of Hoffmann's stories with a meta-narrative. I explore the ways in which Hoffmann frames his stories with a meta-narrative, using this narrative to emphasize the magic in his stories. Hoffmann himself composed musical works, although many have forgotten this fact in interpreting Hoffmann's literary works. Alongside his narrative framework, I examine the functions of music in his work. To emphasize the importance of music, I incorporate Offenbach's opera into this interpretation of Hoffmann's stories which Offenbach adapted for his opera: The Sandman, Rath Krespel, and The Lost Reflection, from The Adventures of New Year's Eve.

Social Science/Humanities

Poster Number 182: Evalyn Stow

Spatio-Temporal Effects of Climate Change on the Diet of North American Hunter-Gatherers

This project focuses on the effects of climate change on the foraging behaviors of prehistoric hunter-gatherer groups in North America. The large amount of available information concerning archaeological food remains and paleoenvironmental data in the academic literature and government agency databases makes North America an excellent place to test these hypotheses. Questions driving this research are: 1) How does the caloric risk and return portfolio of North American hunter-gatherers vary across space and time? 2) What was the effect of climate change (e.g., precipitation, temperature, and seasonality) on hunter-gatherer subsistence behavior and food security risk management viewed through the archaeological record?

Social Science/Humanities

Poster Number 183: Erin Straka

Gender Differences in Time off after Birth

This project will examine how and why men and women differ in the amount of time they take off from paid work after the birth of a child. We may also examine some of the consequences of those differences. We will review the literature on the issue, generate suitable research questions, and locate data that could be used to answer the research questions. Ideally, we will also begin coding and analyzing the data.

Poster Number 184: Aleix Tews

Does learning Russian change the way you speak English?

The purpose of this research is to experimentally study the effect of learning Russian as a second language on the production of particular English sounds, more specifically consonants, by native American speakers of English. Russian and English contrast in many ways, and acoustically it is especially prominent. Praat, a computer software that can be used for acoustic analysis, was used to analyze multiple words produced by participants in this study in the lab. The participants were asked to naturally produce a variety of English and Russian words. There has been research completed looking at how learning English may or may not effect the way Russian native speakers produce Russian sounds, but little research has been preformed on English production of sounds being affected by Russian. The goal is to research if the way English speakers produce sounds in English has been changed due to prolonged exposure to Russian with itâ€™s highly different acoustic parameters. There are two possible outcomes to this study, either English speakers, on an acoustic level, change the way they produce English sounds and produce them in a way that is more in line with Russian phonetically, or that English speakers have no change on an acoustic level after learning Russian.

Social Science/Humanities

Poster Number 185: Skylar Winter

Military Help Seeking

I am working with Dr. Steven Wilson and his team on developing a coding system for analyzing the advice that military veterans provide about how families can communicate with them more effectively in situations where family is worried about a veteran and wants to encourage the veteran to seek professional help. If you look at the Wilson et al. article in health com, youâ€™ll find statistics such as that about 20% of post-9/11 vets screen positive for PTSD, that the majority do not seek professional help, and that families often play an important role when veterans do seek help.

Social Science/Humanities

Poster Number 186: Rebecca Woo, Kaitlyn White, Yaxuan Jiao

Mandarin-English Multilingual Acquisition Project

As cultural diversity becomes emphasized in society, scientists and researchers are becoming more involved in the process of multilingual acquisition. Despite the cognitive and cultural

benefits of bilingualism, the persisting negative views on the acquisition of language have led to the loss of the heritage language in subsequent generations. This project focuses on transcribing and coding videos of language productions made by children whose native language is Mandarin and were exposed to English at a later age (three years old or older). Through studying the grammatical productions of questions and wh- movement, this project will focus on how children apply their knowledge of grammar, be it their native or acquired, to their speech.

Keywords: linguistics, multilingual acquisition, bilingualism, transcribing, coding

Social Science/Humanities

Poster Number 187: Kate Yeater

Presence to Influence

This multidisciplinary team is carrying out research at the 2016 IUCN World Conservation Congress (hereafter WCC) in Honolulu, Hawaii from September 1-10, 2016 (http://www.iucnworldconservationcongress.org), to compliment work completed at the 22st Conference of Parties to the 2016 UN Framework Convention on Climate Change (hereafter COP21) held in Paris, France. Using collaborative event ethnography, an innovative team-based approach for studying large-scale environmental governance meetings (see Campbell et al 2014), we will analyze how indigenous and other marginalized groups in global environmental politics access, engage, and pursue their agendas at WCC and COP22. We direct our attention to these practices of politics within the themes of indigenous rights, forests, and biodiversity as they relate to climate change and justice.

Social Science/Humanities

Poster Number 188: Kate Yeater

Supporting Forest Defenders: An Anthropologist's Perspective on Advocacy and Research

For many indigenous peoples, the rainforest is a source of cultural and spiritual identity, but threats to its viability have profound impacts on both human communities and ecological processes. This work identifies indigenous engagement with spaces and discourses to promote protection of the rainforest and examines threats to livelihoods and forests. It also seeks to uncover how practicing anthropologists are uniquely trained and positioned to work directly with indigenous communities in their pursuit for forest conservation and rights. Ethnographic fieldwork experiences with the Kayapó in the Brazilian Amazon, an internship with Amazon Watch, and collaborative event ethnography conducted at the World Conservation Congress frame the argument for the value of engaged anthropology. Fieldwork is situated among issues

of Amazonian politics and governance, indigenous rights, rainforest conservation, and barriers to advocacy and activism. Reflection on anthropological methods uncovers how anthropology practitioners can best support indigenous efforts for forest protection and self-determination.

Social Science/Humanities

Poster Number 189: Michelle Zhang

Thymus Morphology and Health Status

The thymus is a lymphoid organ. Variation in thymus size has been generally associated with health status. The same has been hypothesized about the shape of the thymus. However, very little is known about the functional morphology of the thymus. In this project students will help Dr. Erik Otarola-Castillo and Dr. Amanda Veile (ANTH) to quantify thymus shape and test hypotheses of its relationship to health status. Under the supervision of Dr. Otarola-Castillo and Dr. Veile, interns will analyze the morphology of thymus images in 2D and 3D. Interns will learn the basics of 3D-scanning of objects, various data manipulation techniques and use the R-programming language including coding functions, routines, and documentation.

Life Science

Poster Number 190: Ryan Arlinghaus

Small Peptide inhibitors of membrane induce aggregation of alpha synuclein in Parkinson's Disease.

Parkinson's disease is a neurodegenerative disorder characterized by motor and non-motor impairment as a result of neuronal cell death. α-synuclein (aSyn), an intrinsically disordered protein, has been associated with the potential onset of Parkinson's disease. Recent findings suggest that aSyn self-aggregation in neurons is increased ~1,000 fold in the presence of lipid vesicles when compared to the soluble form of the protein. In addition, the interaction of aSyn with negatively charged synthetic vesicles has been shown to be associated with increased membrane permeabilization and leakage. The increased vesicle permeabilization due to aSyn membrane induced aggregation is a probable mechanism for cellular toxicity. In our recent studies, a series of 5 peptides were identified that are capable of inhibiting the permeable effects of aSyn on the membrane significantly. Using the 5 peptides as a template, a fragment library of 20 peptides will be generated using solid phase peptide synthesis. The fragments will then be tested for their effectiveness at inhibiting aSyn permeabilization compared to their larger counterparts. The comparison will be completed using model small unilamellar vesicles composed of egg PG: egg PC lipids in a 1:1 ratio loaded with calcein fluorescent dye. The increase in fluorescence with time will be used to identify the overall leakage of the synthetic

vesicles. The result of this project could reveal the active portions of the peptides as well as decrease the overall size of the peptides, aiding in their potential clinical applications. Further studies could involve the identification of a mechanism for membrane permeabilization and optimization of the peptides in-vivo.

Life Science

Poster Number 191: Jennifer Hensel

Optimization of Primary Cultures as an in vitro Model of Parkinson's Disease

Parkinson's disease (PD) is a neurodegenerative disease characterized by a loss of dopaminergic neurons in the substantia nigra region of the brain. We used an in vitro model based on primary mixed cultures to study effects on dopaminergic neurons as well as neurite retraction and regeneration. The primary mixed cultures include neurons and glial cells, specifically microglia and astrocytes. It is critical to control the amount of glial cell growth for these primary mixed cell cultures and insults to serve as an in vitro model of PD. The herbicide paraquat and the pesticide rotenone are known to be associated with the development of PD by causing dopaminergic neuronal loss and are used to model PD like effects in primary cell cultures. Rotenone's toxicity is non-specific and is dependent on microglia. However, paraquat is selectively toxic to dopaminergic neurons. Ara-C is an anti-metabolic compound that stops the proliferation of cells. When primary cultures are treated with Ara-C it allows control of the cell culture environment by keeping the amount of glial cells constant. This study was aimed optimizing primary cell cultures with various Ara-C treatments with the objective of controlling the glial growth that interferes with establishing a suitable model of PD like cellular phenotype. Our methodology includes a phenotypical and quantitative analysis of astrocytes and microglia after the administration of two concentrations, 17ÂµM and 20ÂµM, of Ara-C on the primary mixed cultures for 24 h and 48 h. We found that the 48 h Ara-C treatment seems to control glial cell overgrowth better than 24 h of treatment. In conclusion, these results suggest that glial cell growth can be successfully controlled; therefore, PD insults that depend on the number of glial cells are showing specific dopaminergic cell loss, mimicking one of the main features of PD.

Life Science

Poster Number 192: Sin Ying Ma

Evaluation of Neuroprotective Botanical Extracts in Parkinson's disease

Parkinson's disease (PD) is a neurodegenerative disorder characterized by a loss of dopaminergic neurons in the mid-brain. Pathologically, the death of dopaminergic neurons is related to the aggregation of alpha-synuclein (Î±Syn) protein; which is enhanced by the A53T

point mutation, mitochondrial dysfunction, or oxidative damage. Exposure to the pesticide rotenone and the herbicide paraquat (PQ) can increase the formation of reactive oxygen species (ROS) and accumulation of αSyn oligomers, leading to cell death. Current PD therapy only treats motor symptoms without arresting disease progression. Our aim is to discover an affordable therapeutic target that can stop or reverse neuronal cell death. Native American tribes utilize botanical remedies, such as elderflower and garlic, to relieve PD-related symptoms. We are interested in (i) studying the effects such plants have on PD-related neurotoxicity, and (ii) understanding the mechanisms by which they function. Native American botanical remedies have been suggested to achieve neuroprotection through activation of Nrf2, a transcription factor that activates protective genes by increasing the expression of antioxidant proteins. The goal of this study was to evaluate the effects of various botanical extracts used by Native American tribes in rescuing neurons from PD-related insults, including A53T-αSyn over-expression and exposure to rotenone or PQ. Neuronal cultures were exposed to either rotenone, PQ, or A53T-encoding adenovirus to induce neurotoxicity. Some of these cultures were treated with botanical extracts to observe rescuing effects in affected dopaminergic neurons. Upon neurite length analysis, neuroprotection from oxidative damage was visualized. Identification of neuroprotective botanical extracts can present new therapeutic agents that can arrest dopaminergic cell death to improve prognosis of PD.

College of Pharmacy

Innovative Technology/Entrepreneurship/Design

Poster Number 212: Govind Girish, Alexander Lutkenhouse

Autonomous Rally Cars using Aggressive Driving Models

Our team is working on creating an autonomous rally car that uses aggressive driving models to navigate and steer. This is the next jump in Autonomous Driving. There is already much research done on autonomous driving in regular conditions, such as city streets and suburban neighborhoods. Autonomous cars right now are incapable of handling conditions such as slick ice, mud, sand, flooded area and rough terrain. Our car attempts to bridge the gap between normal autonomous cars and off-roading, using inspiration from rally car racing.
We use a LIDAR (Light Detection and Ranging) sensor, paired with an IMU (Inertial Movement Unit) and Encoders to form a clear idea of the car's surroundings. We then create a route using aggressive driving algorithms. The entire car is being constantly monitored for any slipping or change in the environment. The car's architecture consists of an NVidia TX-1 "Jetson" Chip which will run a Linux Operating System and include ROS (Robotic Operating System) libraries. The TX-1 will handle the high-level processing and pass the control information to a lower-level computer (Arduino Uno), which will then send signals to steering and throttle. All the sensory data and feedback loops will integrate into a SLAM (Simultaneous

Localization and Mapping) visualization that can display the car's surroundings in a way that both a driver and the car can understand.

Innovative Technology/Entrepreneurship/Design

Poster Number 270: Hongda Zeng

Face Recognition within Mobile Devices

Mobile devices are becoming increasingly capable of providing reliable biometric data. They can now be used to authentic citizens as they arrive in the United States. The Mobile Passport App is a mobile application by U.S. Customs and Immigration which allows a user to pass through ports of entry faster by preemptively submitting biometric and other information. The app asks the user to provide a selfie which will be used for authentication purposes. This project determines how camera angle effects image quality and facial recognition as well as determines the best angle for matching future selfie images. To accomplish this, an experimental rig was constructed to take multiple selfie images of a subject at 5 angles (20, 10, 0, -10, -20 degrees relative to the horizon). We also asked subjects to take selfies at an angle they are most comfortable with. 13 subject were used and 3 picture per angle were taken. It was determined that when the phone is at degree 0, directly in front of the subject, the images will have the smallest false acceptance and false reject rate relative to other angles. It was also determined that lower angles (-10, -20) has less false acceptance and rejection rate compared to higher angles (10,20). It was also observed that user determined angle have the worst performance while -10 degrees have the best performance in terms of pass rates determined by the facial recognition software. The results of this project can be used to improve future application performance by providing a guide to inform users of the best angle to take their selfies for authentication purposes.

College of Science

Innovative Technology/Entrepreneurship/Design

Poster Number 271: Yunqian Zou

Application of Ion-Mobility MS in Asphaltenes Analysis

Asphaltenes are the common byproduct of oil industry. However, the occurrence of asphaltenes will lead intractable problems in oil refining; like: clogging wells, adhering pump, acidizing treatment, subsurface formation and generating incompatible fluids. Therefore, studying the molecular structure of asphaltenes, and finding the method to degrade and utilize asphaltenes becomes especially important. In our research, base on the mass spectrum of crude oil, we use â€œmass spectra re-constructionâ€ approach to built the model compounds in asphaltenes. This is a method via calculating the mass to charge ratio and analyzing the characters of peaks on mass spectrum to design the model compounds that are consistent with these features. In the last semester, I successfully synthesized the model compound 3-(2-phenoxyethyl)pyridine and applied collision-activated dissociation experiment â€œMS2â€ to test it. From the result of MS2 experiment, I got the chemical properties of 3-(2-phenoxyethyl)pyridine which were useful for finding the methods to degrade or utilize it. Another model compound C28H26 island molecule I designed is still in synthesis process.

Life Science

Poster Number 195: Nigel Anderson

Spatial Differences in the Frequency of Color Morphs in TÃºngara Frogs

Local population-specific polymorphisms are particularly common. Several explanations have been proposed to explain this phenomenon including reduced gene flow and spatial variation in selection. Here we investigate this phenomenon in tÃºngara frogs (Engystomops pustulosus) which have two distinct color patterns (solid and striped). We found that these two color morphs occur in significantly different frequencies along a forest-urban gradient. We hypothesize that these different frequencies in color morphs are maintained by selective predation. To test this hypothesis we performed selection experiments in the field using clay models of both color morphs on leaf litter and soil backgrounds along forest and urban habitat transects. We also performed a background choice experiment to examine habitat preferences by individuals of the two color morphs. Our results examined potential selection pressures imposed by predators on spatial variation of the two color morphs and their background

matching behavior. Overall, this study reveals differences in frequencies of the two color patterns and examines morph-specific differences in predation rates and habitat preferences.

Life Science

Poster Number 197: Sahej Bains

Mutational and Biochemical Analysis of Isoprenylcysteine Carboxyl Methyltransferase

Ninety percent of pancreatic cancers are attributed to mutations in the Ras protein, making it important to inhibit the overactivity of Ras signaling in cells. This research targets oncogenesis by studying a post-translational modifying enzyme of Ras called Isoprenylcysteine carboxyl methyltransferase (Icmt). Elucidating and inhibiting the unknown Ras binding site of Icmt will allow for the development of therapeutics that cause mislocalization and inactivation of Ras in cancer. To characterize this binding site, site-directed mutagenesis was used to introduce mutations into the yeast homolog of Icmt, Ste14p. Residues L33, L34, L40, L176, L190, and L195 were mutated to alanine and residue F80 was mutated to tyrosine. When tested with a methyltransferase assay, all mutants exhibited a loss in activity as compared to wild type (WT). Noticeably, L190A retained only 44% WT activity suggesting that this residue may be involved in the Ras binding site of Ste14p. These mutants were further analyzed with a trypsin digestion which revealed cleavage patterns similar to WT indicating that the structural integrity of Ste14p remained intact regardless of these mutations. A substrate specificity assay showed that L190A differed from WT, signifying its importance in the binding site. Photolabeling experiments should be conducted in the future to validate if these residues are vital for the Ras binding site of Icmt. These results will then be utilized to design more potent and effective drug therapies to minimize Ras signaling in cancer cells.

Life Science

Poster Number 198: George Barth

Soil Aggregate Content of the Upper Sangamon River Basin

Food security is an important concern and use of land for farming is extensive, including areas with low production. Current farming practices can be destructive, causing high surface erosion and the breakup of aggregates. Soil aggregates are important for the soil as they are sites for mineral adsorption, increase the stability of organic matter and nutrients in soil, they help to determine soil structure and the pore spaces within and between aggregates help for movement of air, water, & plant nutrients (garey, 1954, Hartage 1995). We are looking at 6 sites, 4 of which are farmland, a recovering grassland, and a forest site. These sites are found within a single watershed located in the Upper Sangamon River Basin. To evaluate the

aggregate content we separated the samples into 5 or 6 components; coarse particulate organic matter (floating plant material > 2mm), the free light fraction (floating material < 2mm), large macroaggregates (> 2mm), small macroaggregates (250micron > 2mm), microaggregates (53micron > 250micron), and free silts & clays(< 53micron). We found the agriculture sites to have greatly reduced aggregate content, when compared to the forest and recovering grassland sites, and tended to have much higher free-silts and clay fraction. The higher free silts and clay allows for easy erosion of these components when exposed to the surface. With fewer aggregates, the agriculture sites lose the ability to stabilize soil organic matter and allow nutrients to be carried away from the soil more easily, reducing the fertility.

Life Science

Poster Number 200: Evan Billings

The Crystal Structure of the Transferrin Binding Complex in N. gonorrhoeae

Within the Neiserria family of bacteria, there are two pathogenic species, N. gonorrhoeae and N. meningitidis that are responsible for causing the diseases gonorrhea and meningitis, respectively. To survive, these bacteria need to import iron for metabolic use and therefore, have evolved a way to import iron from their host. In humans, iron is transported throughout the body by proteins such as serum transferrin in the blood. Neisseria have evolved specialized proteins on the surface of their membranes that specifically bind to transferrin to import the iron for their own metabolism. The surface proteins that are responsible for this are called transferrin binding protein A (TbpA) and its coreceptor transferrin binding protein B (TbpB). Together they form the transferrin binding complex. In 2012, the structure of the TbpA bound transferrin complex in N. meningitidis was determined by our research group. My project focuses on the structural determination of this complex in N. gonorrhoeae; which is not known. I am expressing these proteins in E. coli and will then purify them by affinity chromatography, crystallize them using high-output screening methods and determine the crystal structures using the molecular replacement method. I will subsequently compare the N. gonorrhoeae to the structures of the N. meningitis strain to determine the similarities in the two iron piracy mechanisms between the two strains. Ultimately, this research has the potential to lead to new antibiotics that target this binding system to prevent the importing of iron from transferrin, thus preventing the pathogenic bacteria to thrive.

Life Science

Poster Number 201: Chufan Cai

The role of micro-RNAs in regulating acute neutrophilic inflammation

Acute and chronic inflammation drives the pathology of various diseases. It has long been appreciated that activated neutrophils promote the development of the immune pathology and their presence and may cause detrimental effects. MicroRNAs play essential roles in numerous biological processes, including the development of heart diseases, as well as neutrophil development and activation. A list of microRNAs expressed in human neutrophils is available. However, a systemic evaluation of how individual microRNAs may regulate neutrophil function is currently lacking. The absence of such knowledge creates a missed opportunity to harness microRNAs as tools in the prevention and treatment of heart diseases Our goal is to understand the mechanisms regulating the recruitment and activation of neutrophils. The objective of this application, is to identify microRNAs that can suppress neutrophil activation in a localized and systemic inflammation model using zebrafish embryos. Our central hypothesis suggests that the function of individual microRNAs is sufficient to modulate neutrophil activation. The rationale for the proposed research is that, once we identify the microRNAs and their related signaling molecules that suppress neutrophil recruitment, we can use this knowledge to inform the design of microRNA-based therapeutics that suppress the acute neutrophil activation which is detrimental in transplantation and heart diseases. We have screened for miRs lowly expressed and neutrophils and overexpressed them individually, where we identified candidates which decreased neutrophil recruitment to the regional infection and injury site, an as well survived better in pathogen and sterile inflammation challenge while not affecting total neutrophil abundance. The target of these miRs warrant further investigation, but once we obtain the targets and validate them, we suggest a potential avenue to fine tune neutrophilic inflammation moderating the accompanying detrimental effects.

Life Science

Poster Number 202: Mackenzie Chapman

Simocephalus and D. dentifera feeding rates

Feeding assays are studied to see how much an individual species may consume in a given time. Studying two different species in one study shows the competition between each species. Research competition causes reduction in population sizes of competing species. Simocephalus and D. dentifera feeding rates were studied in this experiment, trying to better-understand the competitive interaction between both species. This experiment was performed with 15 replicates of each species in an individual falcon tube with a specific amount of food and kept in the dark for two days. Measurement of absorbance values, using a fluorimeter, and body size were taken at the end of the two days. This experiment was repeated the week after. The data was compared using graphs to standard values. We did not find any significant differences in feeding rate between the two species, except that larger animals consume more food. Further projects will be performed to understand competition between these two species.

Life Science

Poster Number 203: Cara Christensen

Variation in mobbing behavior of mixed flock songbirds

Mobbing is an anti-predator response that is observed in mixed species flocks of Carolina chickadees, Tufted titmice, White-breasted nuthatches and Downy woodpeckers. In this study, we examined variations in mobbing behavior of such flocks across three forest sites in Indiana. Calls of a known predator of these species (Eastern screech owl) were played near naturally occurring mixed flocks, and the response of the flocks was recorded. Preliminary data suggests that all three populations respond to a predation threat and there is no difference in latency of flock approach between sites. We found some differences across sites in latency and approach order at the species level. Nuthatches approach within ten meters from the speaker significantly faster at the first site. However, titmice are more likely to come within twenty meters first at the same site. At a second site, titmice are more likely to come within ten meters later. We are currently examining whether these observed patterns are seasonal.

Life Science

Poster Number 204: Nickoulas Cooper-Garcia

Frequency Variation in the Song of Carolina chickadee: An Added Dimension of Vocal Complexity?

Carolina chickadees (Poecile carolinesis) have a relatively simple song system, containing four elements â€" fee-bee-fee-bay. Our analysis of chickadee song patterns shows an added dimension of complexity in the form of modulation of element frequency. This study looked at variation in the frequency of song elements of chickadees across three independent populations in Indiana. Elements of the fee-bee-fee-bay song were mapped from extensive samples of natural vocalizations. We characterized song types based on shifts in frequency and duration. We further examined the effect of social networks, spatial flock dynamics, and habitat characteristics on patterns in song types across sites. Our results have shown three distinct frequency variations in the first fee element at one site and another variation transposed lower than the others at another site. Further research is in the process.

Life Science

Poster Number 207: Theresa Emeli

Impact of Chromosomal Genes in the Growth and Pathogenesis of Salmonella

It is important to understand the life cycle, growth, and infection process of pathogens in order to determine their ability to replicate and thrive in various environments. One way of doing so is through understanding how certain genes used by bacteria impact the overall growth and lifecycle by determining which genes are essential for certain functions and in maintaining the organism. My project aim is to determine the impact of certain gene loci found in the bacterial chromosome of Salmonella and determine their impact on the virulence and survival of Salmonella bacteria in various hostile environments. The intent is that this project will reveal more information regarding the function and impact of certain gene loci in Salmonella that are recognized as important for nutrient uptake and homeostasis. The results obtained from this project can help bring new information regarding these gene loci which can be used to study other enteric bacteria that poses gene homologs of the specified gene loci. The results may also reveal how alternative treatments impact Salmonella when used to combat and prevent infection.

Life Science

Poster Number 209: Elizabeth Frye

A comparison of flaviviral specific infectivity

Members of the Flaviviridae family, such as Dengue virus and Zika virus, are arthropod-borne, positive sense, single stranded RNA viruses. Flaviviruses have an essential role in human health as they are responsible for millions of infections worldwide each year. With the 2015-2016 Zika virus outbreak as well as Dengue virus endemic to regions worldwide, further study of flavivirus infection and replication is crucial. Specific infectivity is one such way to compare viruses. Viral specific infectivity is the ratio of viral particles to infectious units and can be used as a benchmark to compare how infectious viruses are under different parameters in cells. The objective was to determine the specific infectivities of various flaviviruses and compare them. This may provide ground work that can lead to elucidating further infection and replication characteristics at the molecular level for Flaviviruses.

Life Science

Poster Number 210: Anav Gagneja

Canviz: A web application to computationally analyze and visualize compound-proteome interaction networks

Structure-based drug discovery is typically limited to screening a compound library against one protein target to identify leads that can be used to develop drugs to treat the disease. The most effective drugs in humans inevitably interact with and bind to multiple proteins, a feature that traditional models based on single target drugs fail to consider.

The Canviz web module, instead, efficiently predicts likely binding partners for a small-molecule compound with entire structural proteomes. The module utilizes these predictions to create interactive visualizations of the binding network between the small molecule and the proteome of interest. The user inputs the compound in any popular format or as a 2D sketch and selects an organismâ€™s proteome of interest. The back-end calculates interaction of the query compound with experimentally known and pre-computed predicted 3D structures of proteins for the selected proteome. The modular nature of the web application allows for other algorithms to be used in combination as well to get consensus results.

The module predicts target proteins for the compound in the selected proteome of interest and compiles information about known interactions, biological expression, and related disease information from biological databases such as EMBL-EBI, Biogrid, and BioGPS. Canviz uses the Cytoscape.js graph theory library to create and visualize the binding network of the proteome with the query molecule. Users can filter through proteins by function, interaction score, expression, or any other characteristics depending on their biological question. Users can switch between multiple views including the network graph, a sorted tree map, a simple list of ranked proteins, etc. allowing for flexibility of representation depending on context of analysis.

In summary, Canviz will provide open and free access to a powerful platform for anybody to perform systems-based virtual screening of proteomes for effective drug design and discovery.

Life Science

Poster Number 213: Caityln Green

Genetic Influence on Growth Phenotypes in Mice

Growth is important in the development of an animal and is primarily controlled by genetics and the environment. Although heavily studied, the exact role genetics plays on growth has yet to be fully elucidated. This project aims to identify genetic loci responsible for growth. Using recorded data from 51 BXD recombinant inbred mouse lines fed either adequate (0.5%) or low (0.25%) calcium diets from 4 to 12 wks of age (n=8/line/diet), we assessed the extent of genetic control on four growth phenotypes; growth rate (GR) during rapid growth phase (day 28 to 60), fat pad weight (FP), femur length (FL) and BW (at day 81). The effect of genetic background

(line), dietary Ca and their interaction were tested by two-way ANOVA. Only genetic background showed a significant impact (p<0.0001) on all four phenotypes indicating that genetics controls growth. Since dietary Ca showed no significant effect, the data from mice fed 0.5% Ca diet was treated as the discovery cohort for genetic mapping study and data from mice fed 0.25% Ca diet was used to validate the results. We used composite interval mapping to genetically map the line means for GR, FP, FL and BW. Candidate genes underlying loci were identified with PROVEAN analysis (protein coding effects) or eQTL analysis in WebQTL (mRNA level effects). The most intriguing finding was that Chr 12 contained significant and putative loci controlling for GR, FP and BW in both cohorts. This indicates strong associations between these loci and growth. Within the loci, we have discovered candidate genes that influence multiple growth-related phenotypes. Our study demonstrates that multiple genetic factors determine the variations in growth.

Life Science

Poster Number 214: James Held

Determining specific, high affinity binding motifs for histone linker protein H1 in DNA

The family of histone proteinsâ€™ primary function is to aid in the condensation of chromatin. Core histone proteins assemble to form a nucleosome; a protein complex that DNA can wrap around. Unlike the aforementioned core proteins, histone linker protein H1 sits on top of the nucleosome-DNA complex and serves to keep the DNA and nucleosome â€œlinked.â€ Histone protein H1 has been found to play an essential role in maintaining higher-order chromatin structure and regulation of gene expression. H1 protein directly interacts with DNA by binding to the surface of DNA near nucleosomes and functions to condense chromatin, thereby acting as a transcriptional repressor of genes in that region. Previous studies show that histone H1 protein may preferentially bind to AT rich regions of DNA, however; precise sequence patterns have not been defined. We will analyze the binding specificity and affinity of H1 to DNA by utilizing a modified polymerase chain reaction (PCR) Selex procedure for a synthetic oligonucleotide (N45) and a protein binding filter assay to sequentially select for DNA sequences that have the highest affinity for histone H1 protein. After isolating an oligonucleotide sequence that shows high affinity for H1, the sample will be submitted for high throughput sequencing. The sequence will then be analyzed for motifs and other qualities that would explain why the specific sequence preferentially exhibited higher affinity for the histone H1 protein.

Poster Number 215: Baylie Hochstedler

Effects of resources and parasitism on competition between a native and invasive zooplankton

Competition is a major influence for species in every community. The outcome of competition between two individuals can change depending on the environment and the availability of resources. The goal of this study is to examine how food availability and the presence of a pathogen can influence competition between a native and invasive species. To examine this, we used Daphnia dentifera and Daphnia lumhotzi, a native and invasive species of zooplankton respectively, as model organisms in a two-by-two factorial design experiment. The beakers were divided equally into two food treatments, one of high food levels and one of low food levels. Then half of the beakers in each food treatment were exposed to a native fungal pathogen Metschnikowia bicuspidata. For 6 weeks, the beakers were sampled weekly to track the numbers of individuals of each Daphnia species and the number of infected individuals. We found that lower food levels produced lower population densities and lower disease prevalence. Also, we found that lumholtzi were better competitors in environments with higher food levels. This study demonstrates that the outcome of competitive interactions between native and invasive species can be context-dependent.

Life Science

Poster Number 216: Taylor Hornung

Dopaminergic Hypo-activity in Children with Autism Spectrum Disorder: A Study of Spontaneous Eye Blink Rate

Spontaneous eye blink rate (EBR) is considered to be an indirect, non-invasive measure of central dopaminergic activity in the brain. Dopamine is involved in multiple behaviors and cognitive processes, including executive functions, reward-seeking, and repetitive behaviors, all of which may be atypical in autism spectrum disorder (ASD). Previous studies indicate that ASD may be associated with either dopaminergic hyper- or hypo-activity and therefore the status of dopaminergic function remains unknown. The objective of the current study was to further investigate dopaminergic activity, as indexed by spontaneous EBR, in children and adolescents with ASD. Participants included twenty-one children with ASD and nineteen age and IQ matched typically-developing (TD) children. Electroencephalography (EEG) data were acquired while participants completed two three-minute blocks of eyes-open resting EEG. Participants were shown a grey screen with a black fixation cross and were instructed to relax, remain as still as possible, and to look at the cross. Spontaneous EBR was measured using a bipolar

vertical electrooculography recording. For each block, blinks were scored and EBR was determined by dividing blink frequency by the block duration. EBR was entered into a mixed-model repeated measures ANOVA with between-subject factor group (ASD, TD) and within-subject factor block (1,2). Blink rate was significantly reduced in the ASD group (M = 12 blinks/minute) compared to the TD group (M = 19 blinks/minute). Results of this study indicate that ASD is associated with dopaminergic hypo-activity and suggest that EBR may be a useful measure of dopamine function in children with ASD.

Life Science

Poster Number 217: Hannah Horton

Examining the role of Mettl21c in myoblast differentiation

Due to a continuously increasing life expectancy, age-induced disease is rapidly gaining relevance as a public health concern in the United States. Sarcopenia, the age-related decrease in muscle mass and quality, affects one-third of adults over the age of 60, but unfortunately, the disease is still poorly understood. Therefore, an investigation of the molecular mechanisms of sarcopenia is necessary in order to develop methods of prevention and treatment. The goal of our project is to characterize novel regulatory elements that play a role in muscle development. Specifically, we focus on Mettl21c, a lysine-methyltransferase that is expressed exclusively in skeletal muscle. A genome-wide association study suggests that Mettl21c is related to myogenesis. To investigate this association, we induced the overexpression of Mettl21c in C2C12 myoblasts in vitro using a GFP-adenovirus vector. We performed protein and mRNA analyses in order to observe changes in the expression of developmental markers and identify potential molecular pathways through which Mettl21c regulates muscle mass. Additionally, fluorescent imaging techniques were utilized in order to observe the progression of myofiber formation. Our results indicated that Mettl21c promotes the differentiation of myoblasts and myofiber formation in vitro. In addition, we identify TNF-a and NF-kB as components of the mechanism that Mettl21c uses to regulate muscle development.

Life Science

Poster Number 218: Julianna Ilmain

The effects of food availability and disease on the invasibility of Daphnia dentifera

When a non-native species is introduced to an environment, it has the capability of impacting many aspects of that community. Their effects can include altering the densities of native populations and their risk of disease. Additionally, the availability of resources and the presence of disease may influence the ability of an invasive species to invade a community. A native and invasive Daphnia species were used to study how these factors alter the dynamics of the

modeled community. Native D. dentifera were set up with low and high food treatments. After seven days, half of the treatments were exposed to the fungal parasite Metschnikowia bicuspidata. The invasive species D. lumholtzi was introduced to all treatments after the native populations stabilized and the parasite was established. All treatments were sampled each week to measure the age distributions and proportion of infected individuals for each species. The population densities and rate of establishment of D. lumholtzi will be compared across all treatments. It is hypothesized that low levels of food along with parasite presence will decrease the ability of D. lumholtzi to invade, while high food levels and absence of parasite will allow for a greater rate of establishment. Understanding the characteristics of communities that influence species invasions is essential for predicting which communities are most at-risk from invasive species.

Life Science

Poster Number 220: Thomas Knowles

Schistosoma mansoni Host Choice: A Study on Intraspecific and Interspecific Interactions in Coinfection

Schistosomiasis, caused by several species of trematode in the genus Schistosoma, is traditionally treated in programs involving the systematic administration of praziquantal. The possibility of increasing drug resistance has raised concerns over the efficacy of such protocols, and in response alternative methods for schistosomiasis control have been proposed. Of the many possibilities, the use of Echinostoma caproni, a predator of Schistosoma, in biological control shows promise to reduce the transmission of schistosomiasis. An understanding of the interactions in coinfections of these trematodes can provide insight into the possible use of E. caproni as a biological control agent. Infections in host snails have been shown to alter the immune system, and thus the metabolic products of snails that are tracked by the miracidia stage of Schistosoma. If this is the case, then snails already infected with E. caproni will have a detectable and altered immune response that may discourage potential coinfection and ultimately schistosomiasis transmission through those snails. However, this would also mean that if the miracidia could detect E. caproni and avoid it, it would limit its capacity for biological control. Thus, it is imperative that the interactions between these parasites is better understood. To test this, simple choice chamber experiments using miracidia and snails of various infection states will be implemented. Chemical cues and genetic differences between uninfected snails, Schistosoma infected snails, and E. caproni infected snails will also be analyzed using PCR to gather a sharper understanding of the interactions at play.

Life Science

Poster Number 221: Hana Kubo

Identifying the effects of lung cancer oncosomes on normal human cells

Lung cancer is the leading cause of death from cancer in most industrialized countries (cancer.org) and many lung cancer patients remain undiagnosed until the development of locally advanced or metastatic lung cancer. Despite extensive research, universal biomarkers for the early diagnosis of lung cancer remain elusive, and therapies for treating lung cancer patients remain ineffective and unfocused. This makes the identification of new diagnostic biomarkers and therapeutic targets for the treatment of lung cancer a critical need for patients. Exosomes, nanovesicles secreted by a variety of cell types, are known to transfer bioactive molecules such as proteins and nucleic acids that induce physiological changes in recipient cells. Exosomes secreted by cancer cells, oncosomes, have been shown to promote tumor initiation, progression, and metastasis in various cancer types, but have been understudied in lung cancer. Our study aims to identify the effects lung cancer secreted oncosomes may have on non-cancerous cells of the tumor microenvironment by assessing their tumoirigenic effects on normal lung epithelial cells. To that end, we will treat normal lung epithelial cells with exosomes derived from a panel of human non-small lung cancer cell lines. Treated cells will be assayed for certain hallmarks of cancer such as invasion, migration, proliferation, and anchorage independent growth. Also, as a proxy for metastasis, cancer exosomes will be assayed for the ability to permeabilize a monolayer of normal lung epithelial cells. Further assessing the molecules within cancer oncosomes critical to inducing oncogenic behaviors in normal cells could lead to the discovery of potential diagnostic biomarkers and therapeutic targets for inhibiting tumor growth in affected patients.

Life Science

Poster Number 222: Katia Leon

EVALUATING THE EFFECTS OF PRL TRIMER DISRUPTION COMPOUNDS ON CANCER PROGRESSION

Appropriate levels of protein tyrosine phosphorylation are fundamental to cellular growth, differentiation, migration, and overall cellular homeostasis. These levels are regulated by protein tyrosine kinases and protein tyrosine phosphatases and improper management of tyrosine phosphorylation leads to disease. PRL, phosphatases of regenerating liver, are oncogenes and are found to be overexpressed and associated with the progression of many cancer types. PRL is observed to down regulate the tumor suppressor PTEN, and thus this post-transcriptional downregulation activates the PI3K pathway, which is important for cell proliferation. Many aspects of the PRL family's regulation and function are still unanswered-

among them is the relevance of its trimer structure. PRL is known to crystallize as a trimer and studies show that mutations of PRL's trimer interface decrease PRL mediated cell proliferation and migration, which suggests that the PRL trimer structure plays an essential role in cancer growth. We therefore proposed that if a trimer disrupting compound could be identified, it could inhibit the progression of cancer by blocking PRL induced cell proliferation. Therefore in this study, several PRL trimer obstructing compounds were evaluated based on their effects on cancer progression. So far, we have identified Compound 43 as the best inhibitor of trimerization as it caused extensive decrease in cell proliferation, AKT/ERK inactivation and trimer band ablation. These results were measured using MTT assay, western blot analysis, and protein cross linking. Further research is needed to identify a more potent and specific trimer disrupter for anticancer therapeutic use.

Life Science

Poster Number 224: Yudi Li

Land Surface Temperature Model of Purdue Campus

Nowadays, along with the expeditious urbanization process, more and more ecological and environmental problems in urban areas gradually are under big concerns of the scientists and residents. One of the most prominent issues is the urban heat island (UHI) effect resulting from the constructions of buildings, roads, parking lots, and other types of impervious structures. At the same time, farmlands and parks where covered fully by vegetation at the periphery, and green infrastructure is built all across the city, so there is a very high level of land heterogeneity in the urban area that affects land surface temperature (LST) to different extents. However, most of the current urban ecology researches are carried out at relatively broad spatial scales, so it's imperative to focus more on better resolutions (i.e. at patch level) to further investigate the relationship between LST and land cover characteristics by involving higher proportion of the data that were collected on the field. Based on statistical analysis, different land compositions at Purdue tended to influence the LST variously at different height and different time periods on daily scale, which didn't support the hypothesis that the sites with higher canopy coverage and lower impervious pavement percentage should always be cooler than the others. Moreover, weather conditions and land configurations were also involved to explain the LST in addition to the land compositions, since both of them also played important roles in adjusting the local temperature, and the creation of model is still ongoing.

Poster Number 225: Kuun Lin, Ananya Swaroop

The Role of NT-4 in Intestinal Mucosal Layer

Mice deficient in neuroteopin-4 (NT-4-/-) have been shown to have specific deficits in short-term satiety and long-term satiety, it remains to be answered whether the deficits are due to the loss of vagal innervation in the muscle wall and/or to a possible loss of vagal innervation in the mucosa. While a substantial loss of vagal sensory innervation in the muscle wall of the small intestine in NT-4-/- mice has been shown, the mucosal innervation is yet to be charted. The stomach and the small intestine (especially duodenum) are prime grounds for collecting satiety-relevant signals, the vagus nerve bridges Gastrointestinal (GI) tract and the Central Nervous System (CNS) and allows information exchange. The insights into the vagal innervation in the GI tract will help better understand the communication between the gut and the CNS with regards to satiety signals and other relevant feeding signals. In the present study, we examine the role of NT4 in mucosal innervation in the small intestines by comparing the differences in the innervations patterns between NT-4 knock out (NT4-/-) mice and intact mice (NT4+/+). The Cre-LoxP system allows us to selectively label Nav1.8 voltage-gated sodium channels expressing neurons with tdTomato, a fluorescent protein, in the small intestines. The small intestine of young adult mice is frozen-sectioned after perfusion and the tdTomato proteins is stained by immunohistochemistry. Nerve endings in the small intestine mucosa are scored and compared in the knock-out and the intact mice.

Life Science

Poster Number 226: Arren Liu

Investigating the feasibility of the DNA Endonuclease Argonaute from N. gregoryi as a genome editing tool in E. coli

CRISPR/Cas9 has revolutionized genetic engineering by making gene editing simpler, more efficient, and widely accessible. Recent studies propose that the Argonaute fromÂ Natronobacterium gregoryiÂ (NgAgo) is a DNA-guided endonuclease and may function similarly to the Cas9 endonuclease with the assistance of a single-stranded guide DNA (sgDNA), rather than single-stranded guide RNA (sgRNA). In this poster, I will discuss our studies inÂ E. coli, which include the inability to replicateÂ in vitroÂ cleavage of DNA from initially reported findings and evidence that supports an uncharacterized nucleic acid interaction with NgAgo that culminates in reduced gene expression. These findings suggest that NgAgo has the potential to be utilized as a gene editing tool that can feasibly surpass CRISPR/Cas9 and allow for robust and precise gene manipulation.

Poster Number 227: Helena Lysandrou

Cell-instructive Polymer/Bioactive Glass Composite-Based Scaffolds for Bone Regeneration

Every year in the United States, over 500,000 patients need bone defect repairs, which include bone-grafting procedures. Current bone grafts involve autografts and allografts that are constrained by limited supplies and donor site morbidity. Scaffold-based bone tissue engineering has emerged as a prospective strategy for bone regeneration to overcome these limitations by using biomaterials, cells, and growth factors such as bone morphogenetic proteins (BMPs). However, the clinical utility of BMPs is hindered by supraphysiological dose requirements and ectopic ossification. Therefore, there exists a great need for the development of novel biomaterials-based therapies to promote bone healing without high doses of BMPs. In this study, a three-dimensional (3D) porous scaffold system was sintered from composite microspheres containing biodegradable poly(lactide-co-glycolide) (PLGA) and an ion-releasing novel bioactive silicate glass (BSG). Such a composite combines both the benefits of PLGA mechanical properties with the bone-bonding bioactivity of BSG. The composite scaffolds were optimized to mimic structural and mechanical properties of natural bone and evaluated for bioactivity and cellular responses of human mesenchymal stem cells (hMSCs). Mechanical testing revealed that the optimized composite scaffolds had a compressive elastic modulus in the range of trabecular bone. Cell attachment and viability on the composite scaffolds were validated using confocal microscopy. During a 3-week cell culture, the composite scaffolds significantly promoted osteogenic differentiation of hMSCs leading to enhanced mineralization as compared to control PLGA scaffolds, which further confirmed the osteoinductive potential of the signaling ions provided by the BSG. By demonstrating osteoinductive properties and bioactivity, our composite scaffolds are a step closer towards potential replacements for current bone grafts.

Life Science

Poster Number 228: Ryan Madden

Effects of Traffic Noise on Advertisement Call Plasticity in Japanese Kajika Frog

Anthropogenic noise, such as noise generated by automobile traffic, has become a widespread concern as human populations continue to expand into previously undeveloped areas. For species that rely on acoustic communication to reproduce, human-produced noise can reduce the ability of females to detect mating signals and localize mates. To avoid this masking effect, males in some species alter the rate, duration, or frequency of their signal. This behavioral plasticity has been extensively investigated in birds. The effects of noise pollution on anurans,

however, have been less explored. Here we examined the effects of traffic noise on the calling behavior of the Japanese Kajika frog, Buergeria japonica, using playback experiments. As predicted, we found changes in calling strategies as an effort to compensate for increased background noise. We also evaluated the effect of traffic speed on call plasticity and discuss the implementation of conservation strategies that would reduce noise exposure. In the context of previous studies, our results highlight the species specific nature of plasticity of anuran advertisement calls in response to background noise.

<div align="center">

Life Science

Poster Number 229: Colin Marsh

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Increasing the Anticancer Effects of the Chemotherapy Drug 5-Fluorouracil by adding Vitamin E δ-Tocotrienol and Simvastatin

5-Fluorouracil is widely used in the treatment of colon cancer, yet the results in the past have not been very successful. Response rates for 5-FU-based chemotherapy on advanced colon cancer are only 10-15%. Recent studies suggest that nuclear factor NF-kB likely contributes to acquired resistance of 5-florouracil. Colon cancer is an inflammation-induced cancer, and therefore NF-kB is activated when there is inflammation. NF-kB is a transcription factor, and when NF-kB is active, it binds to DNA and transcribes genes for growth factors, anti-apoptotic signals, and angiogenic factors to repair the inflicted damage. If NF-kB can be inhibited in inflammation-associated cancer cells, it will improve the anti-cancer effectiveness of 5-FU. Studies have shown that vitamin E forms including delta-tocotrienol (δTE) exhibited potent anticancer activities in various types of cancer cells, and especially colon cancer cells. The underlying mechanism is not fully understood, but it is evident that δTE inhibits NF-kB. When cancer is present in specific cells, those cells have a higher rate of lipid synthesis due to an increase in glucose and aerobic glycolysis. Previous data has shown that Simvastatin, a lipid lowering medication, has produced anticancer effects when combined with other substances. By combining δTE with 5-FU and Simvastatin, the goal is to decrease the relative cell viability in order to find either additive or synergistic effects between the three compounds. The model used to produce this data is a cell culture model using HT-29, Stage 3 colon cancer, cells. The relative cell viability is determined via an MTT Assay. Preliminary data suggests positive effects when δTE, 5-FU and Simvastatin are combined, but further experimentation needs to be completed to fully determine the degree to which the relative cell viability is reduced and to determine the underlying mechanism that exists when these three compounds are combined.

Poster Number 230: Sarah Marshall

Transposable element copy number in clonal and non-clonal lines of Schistosoma mansoni Cercariae

Schistosoma mansoni is a human parasite that causes schistosomiasis, a neglected tropical disease that impacts over 230 million people worldwide. The life cycle of the parasite includes both sexual and asexual proliferation stages. Previous research indicates that the genomes of parasites resulting from asexual proliferation are non-identical. It has been suggested that mitotic recombination events during sporocystogenesis create this heterogeneity in clonal cercariae. Repeats such as transposable elements (TEs) are seemingly responsible for creating such recombinations. Transposable elements are mobile repetitive DNA segments that generate genomic plasticity. In order to test the role of TE's in clonal line variation, we mono-infected snails to generate clonal cercarial lines, separated the cercariae into males and females, extracted DNA from 10 replicates of each clonal line, and quantified TE copy numbers of the cercariae using qPCR. We hypothesized that mitotic recombinations would create greater copy number variation within individual clonal populations than the average copy number between the different clonal populations. This is because while the variation within a single clonal population should be high, it should average out to be similar to the other clonal populations. We ran the qPCR on three TEs (Saci1, Perere, and Merlin) and used an internal control gene, GAPDH, to compare the copy numbers among the cercariae. Our results indicate there is high variation in TE copy number within each clonal line, and no significant differences between clonal lines, indicating that TEs may be responsible for the non-identical nature of these sexually reproduced stages.

Life Science

Poster Number 231: William Mbongo

Identifying the Structural and Mechanistic Changes at the PLCepsilonRA2-RAP1 Interface

The phospholipase C epsilon (PLCepsilon) subfamily is of great interest due to its critical role in regulating cardiovascular function. PLC enzymes are a class of proteins that hydrolyze the lipid phosphatidylinositol-4,5-bisphosphate (PIP2) to produce inositol-1,4,5-triphosphate (IP3) and diacylglycerol (DAG), which are key second messengers. IP3 and DAG increase intracellular calcium concentrations and activate protein kinase C. Under basal conditions, PLCepsilon has low activity and is localized in the cytoplasm. The stimulation of G protein coupled receptors (GPCRs) and receptor tyrosine kinases (RTKs) activates small G proteins, including Rap1A, RhoA, and Ras, which bind directly to PLCepsilon and increase its lipase activity while translocating the

G protein–PLCepsilon complex to the membrane. It has been proposed that activated G proteins release autoinhibition within PLCepsilon and/or increase the affinity of the active site for the membrane. PLCepsilon possesses two Ras association (RA) domains at its C-terminus and the RA2 domain is thought to be the primary G protein binding site. This project aims to characterize the interactions between PLCepsilon and the small G protein Rap1A, as this pathway is essential for cardiac contractility and its dysregulation contributes to hypertrophy and heart failure. Methods being employed include the isolation of a Rap1A–PLCepsilon RA2 complex, followed by determination of the X-ray crystal structure. Site-directed mutagenesis and biochemical assays will be used to confirm the contributions of residues at the molecular interface. These studies will provide the first insights into the mechanism by which Rap1A interacts with and activates PLCepsilon.

Life Science

Poster Number 233: Saki Mihori

Intercellular Calcium Waves in the Interommatidial cells of Live Drosophila melanogaster Eyes

Intercellular Calcium (Ca2+) waves have been observed to propagate across glial cells of vertebrate CNS, including the retina, but the mechanisms and functions of these waves are incompletely understood. Our lab recently found that intercellular Ca2+ waves propagate across the honeycomb-like lattice of pigment cells that isolate and optically insulate each unit eye, or ommatidium, of the compound eye. Concurrently, our lab has found that flies become more sensitive to light stress at approximately one week of age. The purpose of my study is to test the hypothesis that Ca2+ waves release trophic factors that support photoreceptor health, predicting that waves may be absent or weaker in older, less stress-resistant flies. LGMR>GCaMP6 flies are immobilized on coverslips and time-lapse fluorescent imaging is done using a cooled CCD camera and the speed and intensity of the Ca2+ waves are measured using ImageJ.

Life Science

Poster Number 238: Jillian Ness

Mutagenesis of Quinone Portal of the b6f complex

In the electron transport pathway, a quinone molecule arrives at the p-site of cytochrome b6f complex. To reach its oxidation site at the [2Fe–2S] cluster, the quinone must be transferred from the inter-monomer cavity between the two monomers through a narrow portal to a position within H-bond distance of the His129 imidazole ligand to the [2Fe–2S] cluster. The portal is defined by two TMH of the b6f complex: the F trans-membrane helix of subunit IV (subIV) and the C-TMH of the cyt b6 polypeptide.

Amino acid sequences of segments of F-helix of subunit IV shows conservation of two proline residues at positions 105 and 112, which act as helix breakers, and are purposed to be responsible for rate of passage of quinone molecule through the portal.

We want to study if the rate of passage of the quinone molecule is affected by size of the portal through which it enters to be oxidized. By introducing more prolines residues in the helix, and thereby making the portal wider, we should see an increased rate of cytochrome f reduction. Conversely, we would like to introduce mutations to the proline residues by changing them to alanines. If they are responsible for the rate limiting step, we should see a slower rate of cytochrome f reduction.

Life Science

Poster Number 239: Kenny Nguyen

Parkin-Mediated Mitochondrial Turnover in Drosophila Nerve Terminals In Vivo

The accumulation of dysfunctional or damaged mitochondria in neurons has been linked to the pathogenesis of many neurodegenerative diseases, including Parkinson's disease. It has been proposed that the Parkinson's-related proteins PINK1 and Parkin regulate mitochondrial removal by selectively targeting depolarized mitochondria for autophagic degradation. The compartmentalization of mitochondrial turnover in neurons still remains unclear, but evidence suggests that mitochondria may be locally degraded the neuromuscular junctions (NMJs). To study this, intact Drosophila nervous systems were analyzed in vivo by performing gentle dissections on third instar larvae to expose the segmental nerves with their NMJs. Both control larvae and parkin mutants were genetically modified to mark mitochondria via mitoGFP expression in their motor neurons, with parkin mutants being additionally modified by deletion of the parkin gene. The physiological states of mitochondria were quantified through measurements of mitochondrial membrane potential, and the density of mitochondria in NMJs were analyzed by measuring the area covered by mitochondria in each synaptic bouton. Unexpectedly, mitochondria of parkin mutants displayed normal membrane potential readings in NMJs, indicating that mutant nerve terminals do not accumulate senescent mitochondria. In addition, reduced mitochondrial density was observed in synaptic boutons of parkin mutants. These results argue against the hypothesis that loss of Parkin results in accumulation of depolarized mitochondria, instead suggesting a reduction of organelle density in synaptic boutons as a result. By elucidating the role of Parkin in neuronal synapses, the pathogenic mechanism of Parkinson's and other neurodegenerative diseases will be better understood.

Life Science

Poster Number 240: Abigail Perkins

Examining Sublethal Effects of 3-trifluoromethyl-4-nitrophenol (TFM) on Lake Michigan's Sea Lamprey (Petromyzon marinus) Populations

Sea lamprey (Petromyzon marinus) populations have been chemically controlled with the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) in Lake Michigan for over 57 years. Since sea lamprey populations still reside in Lake Michigan, these populations may be developing a resistance to the lampricide through rapid adaptation. Sea lamprey from Lake Michigan, Lake Champlain, and the Connecticut River with a history of long, moderate, and no TFM exposure respectively were gathered. The sea lamprey were exposed to sublethal TFM concentrations through a series of toxicology exposures to observe the sublethal effects. Examining the sublethal effects of TFM allows for the comparison of interpopulation differences, and Lake Michigan sea lamprey population's possible resistance to TFM. To compare interpopulation sublethal effects, a subset of surviving sea lamprey were gathered after each toxicology exposure. The respiration of each individual sea lamprey was measured indirectly. Oxygen consumption is dependent on the TFM dose. An observation of differences in oxygen consumption among sea lamprey populations can provide evidence that Lake Michigan sea lamprey populations are developing a resistance to TFM.

Life Science

Poster Number 241: Bridget Perkins

Mapping by Transduction of Lac+ Salmonella Enterica mutants

The mgtC gene on the mgtCBR operon of Salmonella enterica encodes a protein for the uptake of magnesium (Mg2+) and is involved in virulence factors. This study aims to gain a better understanding of the regulation of the mgtCBR operon.

Two strains of S. enterica were used, TL5354, a wild type strain with a mgtB-lacZ fusion, and TL5366, a mutated strain of TL5354 with a mutation in mgtM as well as a mgtB-lacZ fusion. Lac+ mutants were selected from each strain, purified, and named Ju2601 and Jul1301 respectively. The mutated strains were subjected to a series of transductions to map out the location of the mutation, using kanamycin and chloramphenicol resistance and Lac+ colonies as markers. Recipients were selected on either side of the mutated gene to further identify the mutation's location.

Results suggest the mutation may be toward the left of the mgtB::MudJ for the Ju2601 strain. Results of the Jul1301 transduction with the other two recipients need to be conducted to reveal the general location of the mutation. Both strains will need to be further analyzed to identify the exact mutation and location of the mutation, as well as the mutations effects on the strains.

Poster Number 242: April Przyborski

Competition of the Fittest: Interspecific Competition in Parasites Within Intermediate Hosts

Organisms often compete for resources to increase their survival and fitness. Parasites that co-infect the same host compete for finite host resources. Competition between parasites of different species has been widely documented, but little is known about how dynamic these interactions are over space and time. In this context, interspecific competition is examined between parasites seeking out intermediate hosts. Few studies have examined the effects of this competition between parasites and how it can vary over a multitude of time points. The goal of this study is to examine interspecific competition between trematode parasites in their snail intermediate hosts throughout an infection season to determine patterns of co-existence and competitive exclusion between parasite species. Helisoma trivolvis and Physa spp. snails were collected from two wetlands in the Purdue University Wildlife Area throughout the summer. Each snail was measured in length and screened to determine infection status. Parasites were identified using taxonomic guides and genetic sequencing using a nuclear and mitochondrial marker. Results of the identified parasites and patterns of interspecific competition within hosts and across host populations will be discussed.

Poster Number 244: Ellie Reinhart

The Effects of Secondary Microplastics on the relationship between a trematode parasite, Schistosoma mansoni, and its intermediate and definitive hosts

Plastic materials have generated many societal benefits, however the â€˜plastic ageâ€™ has come with downsides. One issue of ecological concern is the accumulation of plastics in the water cycle, and their breakdown into smaller plastics. When plastics breakdown, added chemicals leach into the surrounding waters. One common chemical, Bisphenol A (BPA), can imitate estrogen. It binds to estrogen activation sites and disrupting the endocrine system. BPA has been shown to induce precocious puberty and other reproductive disorders, however it is not known how it affects the host-parasite relationship. To elucidate the effects, I exposed Biomphalaria glabrata snails infected with a trematode parasite, Schistosoma mansoni, to multiple treatments; the current average level of BPA found in nature today (.05 Âµg/L) 100 times the current level (5.0 Âµg/L of BPA) and lastly a control group (well water). How the chemicals affect the parasites transmission ability is of particular concern, because the next stage is capable of infecting humans. To measure transmission, the number of parasites shed from the snail in response to UV light was measured. Parasite abundance was similar for the

group exposed to a higher level of BPA, and the control group, however the group exposed to current levels of BPA had a significantly higher parasite output. This suggests that there is a zone of BPA and therefore microplastic abundance that induces a higher level of transmission for S. mansoni. **Life Science**

Poster Number 245: Kelley Renninger

The Role of Glutathione S-Transferase in Hyperaccumulation of Arsenic in Pteris vittata

Pteris vittata, also known as the Chinese brake fern, is known for its ability to tolerate high levels of arsenic in its environment. Although key genes for hyperaccumulation of arsenic in P. vittata have been determined, the mechanism by which it accomplishes this feat is still unknown. The purpose of this project is to determine the role of a specific glutathione s-transferase, GST1, in this mechanism. Due to observed upregulation of the GST1 gene in RNA sequencing data, it is hypothesized that GST1 is directly involved in metabolic pathways that allow this hyperaccumulation behavior to occur. Gene knockdown by use of RNA interference constructs will be carried out to test this hypothesis. The constructs will be delivered into P. vittata using a gold particle bombardment delivery system. The inability of these modified ferns to survive on arsenic-containing media will confirm the hypothesis that GST1 is directly involved in the accumulation of arsenic. If GST1 is confirmed to play a role in this pathway, further experimentation will be done to determine the substrates this protein acts upon. We hypothesize that GST1 is acting as a peroxidase in this system in order to mitigate the oxidative stress felt by the fern during growth in arsenic-containing media. Discerning the involvement of this protein in arsenic accumulation will allow us to shed light on the pathway used by this fern, creating opportunities for enhanced phytoremediation techniques.

Life Science

Poster Number 246: Danielle Rivers

Effects of an Extract from Lippia origanoides on Apoptosis and Cell Cycle Arrest in Cancerous and Non-cancerous Mammary Epithelial Cells

Conventional therapies that target hormone receptors typically fail to effectively treat triple negative breast cancers (TNBC), an aggressive subtype of cancer that lacks expression of genes coding for estrogen receptor, progesterone receptor and human epidermal growth factor 2 receptor. In previous studies, an extract from the tropical plant, Lippia origanoides has been shown to possess anti-cancer properties. The extract (LOE) was tested on the TNBC cell-line MDA-MB-231 with preliminary results confirming that LOE promotes apoptosis with concomitant arrest of the cell cycle in the G1 phase in TNBC, resulting in a decrease in cell viability. However, to be a viable therapeutic treatment for aggressive cancer, LOE must induce

apoptosis in breast cancer cells specifically without compromising the viability of normal, non-tumorigenic mammary cells. Building on the initial results, we aim to investigate the effects of LOE on the cell cycle progression and apoptosis in the non-tumorigenic mammary epithelial cell-line MCF10A using flow cytometry.

Life Science

Poster Number 247: Alexus Roberts

Niche Partitioning Based on Temperature Gradients in Estuarine Cyprinodontiform Fishes Families: Fundulidae, Cyprinodontidae, and Poeciliidae

Fish communities are often composed of related species that vie for similar resources, thus facing competitive exclusion. In many cases, resource and niche partitioning play a role in supporting coexistence among species. These processes can be facilitated by several strategies such as trophic divergence, utilizing varying prey capture techniques, or occupying different microhabitats based on physio-chemical gradients. Fishes of the family Fundulidae provide an ideal model for studying this phenomenon as they are globally distributed and occupy an array of freshwater, brackish, and marine habitats. Fundulus grandis, F. majalis, and F. heteroclitus are among multiple killifish species found along the East Coast of the United States. Specifically, these three species and related species Cyprinodon variegatus and Poecilia latipinna commonly occupy estuarine communities in Southeastern United States. Niche partitioning within killifish communities based on salinity tolerance has been thoroughly examined, but little experimentation has been completed to determine if other environmental factors play a similar role in reducing interspecific competition. Based on field observation and previous study, we hypothesize that water temperature may be an important environmental factor that supports niche partitioning within these estuarine communities. Using a series of mesocosm experiments in monocultures and simulated communities, we plan to determine if killifish and related species prefer and/or specialize in occupying habitats of differing temperatures to reduce competition and facilitate niche partitioning.

Life Science

Poster Number 250: Morgan Schafer

The roles of non-structural protein 1 in Flavivirus assembly

The recent connection between Zika Virus and microcephaly birth defects and neurological disorders has given way to an emerging public health threat. Flaviviruses are a genus of viruses that have a single-stranded RNA genome and include Dengue Fever Virus (DENV), West Nile Virus (WNV), and Zika Virus (ZIKV), which are mosquito-borne. There are currently no vaccines or antiviral therapies available for these viruses. The Flavivirus genome codes for a single polypeptide that is cleaved into three structural and seven nonstructural proteins. Non-

structural Protein 1 (NS1) has been shown to be essential for virus replication and have immune evasion properties. It exists in multiple oligomeric forms and is secreted as a hexamer which allows it to interact with the innate immune system. NS1 levels in the serum of patients infected with Dengue have been shown to correlate with disease severity. In an effort to understand interactions with the host that lead to disease pathogenesis, we used a mutagenic approach to identify areas of NS1 that contribute to its function in disease pathology. Preliminary experiments have shown NS1 has a role in viral particle formation, making it an attractive target for antiviral drug development. By better understanding the function of NS1 and how specific residues result in different host interactions, we hope to find a target for a vaccine or antiviral treatment that could minimize the number of people infected and reduce the deaths associated with these diseases in the United States and around the world.

Life Science

Poster Number 253: Hanna Smith

Development of an ELISA Assay for Quantifying Thyroid Hormones in Amphibian Larvae

Perfluorinated compounds (PFCs) are synthetic chemicals present in everyday products (e.g., nonstick cookware, stain-resistant fabric, firefighting foam). PFCs are an emerging contaminant of concern due to potential effects on the health of humans and wildlife via endocrine-disrupting effects. We have previously demonstrated that PFCs can reduce growth and delay development of larval amphibians. The goal of this study is to develop a simple analytical method using enzyme-linked immunosorbent assay (ELISA) to measure thyroid hormones (T3 and T4) in metamorphosing amphibians exposed to PFCs. We will determine (1) the relationship between amphibian developmental (i.e., Gosner) stage and thyroid hormone concentrations, and (2) whether this relationship is affected by exposure to PFCs. Therefore, this method will assist in linking endocrine disruption of thyroid hormones to sublethal effects of PFCs observed in our previous experiments.

Life Science

Poster Number 254: Rebecca Steele

Characterizing the Effects of the Conditional Deletion of Mist1 in PDAC Progression

Pancreatic ductal adenocarcinoma (PDAC) is a devastating form of cancer which is extremely difficult to detect, and thus, it is critical to further characterize its development from its origin cell types. It is known that precursor pancreatic intraepithelial neoplasia (PanIN) lesions develop from pancreatic acinar cells. These cells, when exposed to injury, can form lesions called acinar-to-ductal metaplasia (ADM), marked by the induction of ductal genes as well as the downregulation of MIST1, a transcription factor critical for apical-basal polarity in acini.

These events, along with mutationally-activated KRASG12D, have been strongly implicated in PDAC progression. To further characterize PDAC development as it relates to Mist1, we developed a conditional knockout model for Mist1. Through Tamoxifen injection and resulting Cre-recombinase activity, Mist1 is deleted and KrasG12D activated in the adult mouse. These Mist1cKO/KrasG12D mice, along with Mist1Het/KrasG12D and Mist1KO/KrasG12D controls, were administered Tamoxifen and sacrificed 2.5 months post. Surprisingly, we observed a significant reduction in PanIN lesions in Mist1cKO/KrasG12D mice. Hypothesizing that an additional pancreatic insult may aid in inducing PanIN lesion formation, we performed secondary experiments in which we also induced acute pancreatitis (AP) via Caerulein injection. At 7 days post, a similar protective effect was seen in mice with the conditional deletion of Mist1, compared to the controls. In contrast, the positive protective effect appeared to be lost at the 21 day time point. These results show that conditional deletion of Mist1, and therefore the loss of the MIST1 protein specifically, inhibits or delays PanIN formation driven by KrasG12D expression through an unknown mechanism. These results highlight the need to further investigate the mechanism behind the protective effect of conditional Mist1 deletion to establish the role of MIST1 in PanIN formation.

Life Science

Poster Number 255: Katherine Strelau

The transcription factor MIST1 regulates secretory cell homeostasis and stress responses through newly identified target genes

Pancreatic acinar cells produce excessive amounts of protein and can cause pancreatic diseases if they undergo cell stress. If there is a buildup in the amount of misfolded proteins in the cell, a cell state termed ER stress ensues. This initiates the Unfolded Protein Response (UPR), a series of cell changes governed by the activation of transcription factors that enable the cell to adapt to the elevated workload and survive the added stress. One of these transcription factors has been shown to directly activate MIST1, a protein linked to maintaining secretory cell health. Our goal was to establish the role that MIST1 plays in combating ER stress and regulating secretory cell homeostasis.

Genome-wide screening was performed in order to identify possible MIST1 gene targets. Cell culture techniques were then used to investigate MIST1's affect on these putative targets. It was found that induction of MIST1 resulted in the altered expression of genes directly related to secretion and ER stress recovery. It was also determined that MIST1 was capable of regulating the UPR as a whole, directly controlling the expression of other transcription factors responsible for diminishing the negative effects of ER stress. In conclusion, MIST1 not only regulates the overall homeostasis of the cell, but it also directly controls UPR target genes and the UPR itself. Our research on the role of MIST1 in the UPR pathway has great importance in the medical field in terms of developing drugs to combat stress-related pancreatic diseases.

Poster Number 256: Varun Subamanyam

High syringyl lignin enhances cell-cell separation in poplar woody biomass

A key problem in efficient catalytic conversion of biomass to biofuels is the comminution of biomass into fine particles. Lignin variants with high syringyl (S), high guaiacyl (G), and high 5-hydroxy (5-OH) guaiacyl lignin were evaluated for ease of cell separation and catalytic conversion of poplar wood tissue. Cell-cell adhesion is an essential feature of communition. Cells require acidic chlorite oxidation of lignin and dilute alkali extraction of cell-wall polysaccharides to initiate cell separation. This suggests that lignin plays an important role in cell-cell adhesion. Cellulose and total lignin were comparable among the genetically variant poplar lines, indicating that lignin quality, and not abundance was responsible for enhanced separation. Both Alcohol-Insoluble Residue (AIR) and Catalytically Delignified (CDL) poplar wood samples were treated with trifluoroacetic acid (TFA) before subjected to catalytic conversion of cellulose. Preliminary results show that TFA treatment and S-Lignin content facilitates biomass catalytic conversion. Our work provides new insights in lignin modification to enhance yields of biofuels from genetically modified biomass.

Life Science

Poster Number 257: Hana Maldivita Tambrin

Structure-function Characterization of the "Destruction Box" Degron

Anaphase-promoting complex or APC is a ligase that attached ubiquitin to a substrate. By doing so, APC prevents the mitosis cycle to go to the next stage, establishing a stable G1 phase. This indicates that APC is important since it is needed in regulating the mitosis cycle. It was established that the APC binds to the D-box. D-box is the docking motifs where the substrate binds and the D-box is needed for efficient proteolysis. However, It is still unclear what makes a functional D-box because the substrates do not possessed the same motifs, there are various APC degrons that have been identified. Thus, the goal of the experiment is to establish the minimal sequence of the functional D-box. To accomplish the goal, we established an artificial reporter system by mutagenesis, allowing us to identify the important feature of D-box. The artificial substrates is expressed and induced with galactose and have the expression terminated after one hour. The substrate is tagged with anti-protein A and the stability of the substrate is measured over time. The expected result is that if the D-box is removed or mutated, the substrate will be more stable since it will not be able to bind to the D-box. Thus, establishing the minimal sequence of the functional D-box is important since understanding how the APC binds will allow the development of chemotherapy drugs to kill cancer cells.

Poster Number 258: Devang Thanki

An Embryonic Atrazine Exposure Alters Expression of the Tumor Protein D52-Like 1 (TPD52L1) Gene in the Zebrafish Model

Atrazine is a commonly used herbicide in the Midwestern United States. 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 3 ppb. 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, a significant increase at 36 hpf in the 0.3 and 3 ppb treatments and significant decrease at 60 hpf in all three treatments. This indicates that TPD52L1 expressions are induced by atrazine exposure at specific developmental time points.

Poster Number 259: Yannan Tian

Role of the SidE family effectors in Legionella longbeachae virulence

Legionella pneumophila is a gram-negative, rod-shaped bacterium that is capable of causing Legionnaires' disease. It invades and replicates within alveolar macrophages and epithelial cells upon transmission to the human host. (Zink et al., 2002) Formation of a replicative niche is controlled by a type IV secretion system, designated Dot/Icm, which blocks the endosomal-lysosomal degradation pathway within the host cells. (Zink et al., 2002) L. pneumophila is a well-studied model compared to Legionella longbeachae. Both species belong to the family Legionellaceae and are genetically homologous. Nearly all cases of Legionnaires' disease are

caused by L. pneumophila and L. longbeachae. The analysis and comparison of L. longbeachae genome with L. pneumophila has demonstrated common features but also many differences. L. longbeachae demonstrates difference in virulence factors from those of L. pneumophila, though the Dot/Icm type IV secretion system is still essential for the virulence of L. longbeachae. Recent study about L. pneumophila effectors revealed that the SidE family effectors (including SidE, SdeA, SdeB, and SdeC) are able to ubiquitinate Rab33b independently of E1 and E2 enzymes in the presence of nicotinamide adenine dinucleotide(NAD). (Qiu et al., 2016) Based on the homology of two effectors, llo_3092 and llo_3095 in L. longbeachae to the SidE family in L. pneumophila, we predict that they share similar function as the SidE family members in L. pneumophila. Thus the specific aims of my proposal are:

1.   To determine the function of proteins expressed by L. longbeachae genes llo_3092 and llo_3095, testing whether they perform the similar function as SidE family in L. pneumophila, that is, to ubiquitinate the substrates without the help of E1 and E2 enzymes.

2.   Create deletion mutants in L. longbeachae, to test the defective replication demonstrated by L. longbeachae Î"3092, L. longbeachae Î"3095 as well as the double mutant L. longbeachae Î"3092 Î"3095.

Life Science

Poster Number 260: Sarah Tyler, Wyatt Baysinger

Predicting Binding Properties of Small Molecule Inhibitors to the Phosphatase Cdc14

Commonly found in animals and fungi but not in plants, members of the Cdc14 phosphatase family are enzymes that play a key role in the regulation of exit from mitosis. At the end of the cell division life cycle, Cdc14 actives the enzyme Yen1 which repairs DNA and ensures that new cells receive the right number of chromosomes. As it is critical for survival of fungal cells, the inhibition of the Cdc14 enzyme could lead to the creation of fungicides that inhibit fungal growth without affecting crops, such as corn, that lack Cdc14. Using computational modeling, we hope to identify potential small molecule inhibitors with favorable inhibitor/enzyme interactions prior to running inhibition assays. The software used includes Molecular Operating Environment for 3D protein modeling based on X-ray crystal structures and the Schrödinger suite for docking potential inhibitors and creating molecular dynamics trajectories to predict the behavior of a potential inhibitor in the binding pocket. Several different inhibitors are currently being tested in computer simulations and in bioassays, including molecules from the barbiturate and the cinnamic acid families.

Life Science

Poster Number 261: Erika Vannarsdall

Hidden Hearing Loss in College-age Musicians: Electrophysiologic Measures

Recent animal studies have shown that even moderate levels of noise exposure can lead to cochlear synaptopathy, a disruption of auditory nerve synapse structure and function. This has been described as hidden hearing loss because of preservation of normal hearing sensitivity in the presence of auditory nerve damage. We evaluated distortion product otoacoustic emissions (DPOAE) and auditory brainstem responses (ABR) in normal-hearing college-age musicians and non-musicians, to determine if recreational exposure to music produced changes in these responses consistent with hidden hearing loss. For the musicians, results showing larger DPOAE amplitudes above 2000 Hz; reduced SP amplitude; and reduced ABR Wave I and Wave V amplitudes across stimulus levels and rates are consistent with hidden hearing loss. Findings suggest intact or enhanced outer hair cell function (larger DPOAE amplitude); reduced inner hair cell drive (decreased SP) and disruption of synchronized neural activity generating both the auditory nerve response (Wave I) and the more rostral brainstem response (Wave V). Clinical implications of these results include the possibility of early identification of hidden hearing loss among young adults, and counseling regarding hearing protection to prevent hidden hearing loss.

Life Science

Poster Number 263: Mikayla Voglewede

Effect of an Acute Trauma on Microglia Activation

A common symptom of Post-Traumatic Stress Disorder (PTSD) is generalization of the fear response to stimuli that were never associated with the initial trauma. The fear circuit heavily involved in this processing consists of the prefrontal cortex, hippocampus, and amygdala. Stress can also activate microglia. Does the initial trauma in PTSD trigger microglial activation in this fear circuit? To test this hypothesis, we used contextual fear conditioning to create a strong fear response in male Long Evans rats to a specific context by delivering 15 unsignaled 1.0-millivolt foot shocks in this context. The control group was exposed to the same context but did not receive any foot shocks. We have shown that this procedure produces deficits in discrimination learning and fear extinction 9 and 15 days after trauma, respectively. Here, we harvested brain tissue at either 9 or 15 days post-trauma and compared these to non-trauma controls. We used immunohistochemistry with antibodies against the ionized calcium-binding adapter molecule 1 (IBA1), a marker for microglial cells. The intensity of the IBA1 immunoreactive signal over specific subregions of the prefrontal cortex, hippocampus, and

amygdala was determined using ImageJ. Studies assessing changes in microglia morphology and inflammatory status are currently ongoing. These analyses will determine if an acute trauma alters microglia activation at time points when impaired discrimination learning and fear extinction are known to occur, implicating a role of microglia in PTSD.

Life Science

Poster Number 264: Kendra Wang

Functional Studies of the Central Noradrenergic System in Visual Cortex with Optogenetics

The locus coeruleus (LC) is a small noradrenergic nucleus in the midbrain that releases the neuromodulator norepinephrine (NE) to diverse brain regions, including the primary visual cortex (V1). We seek to better understand the role of LC mediated NE release in modulating neural activity in V1, and to study its influence on behavior and control of pupil size. To explore these ideas, we utilized an experimental system designed to express the blue light sensitive optogenetic protein channelrhodopsin-2 (ChR2) in LC neurons and to excite them with light stimulation. A transgenic mouse expressing Cre recombinase under the tyrosine hydroxylase (TH) promoter was used to specifically express Cre in brain nuclei responsible for catecholamine biosynthesis. Adeno-associated virus (AAV) Cre-dependent ChR2 was injected into the LC of both brain hemispheres in a TH-Cre transgenic mouse. Optical fibers were then implanted above the LC in these animals, allowing for optogenetic stimulation of LC neurons with blue (473nm) light. Using this experimental system, we will perform electrophysiological and pupillometry recordings in awake mice during LC stimulation. We will also perform an open field behavior assay during LC stimulation to determine the role of NE on hyperactivity. We expect the results of these experiments to broaden our understanding of the central noradrenergic system.

Life Science

Poster Number 265: James Welch

Restoration of Mature let-7 MircoRNA Through Small Molecule Discovery

MicroRNAâ€™s (miRNA) are a class of small non-coding RNA molecules that pair non-perfectly with messenger RNA to repress protein translation. Most miRNAs are transcribed and then processed twice, firstly by the RNAse enzyme Drosha and then by Dicer. Although all miRNAs share this mode of biogenesis, an additional layer of processing has been identified for one miRNA family, the let-7 family. Let-7 processing by Drosha and Dicer is blocked when unprocessed let-7 is bound by the RNA binding protein LIN28. Because fully processed let-7

family members act to repress the oncogenic genes RAS, MYC and LIN28, which are involved in differentiation, proliferation, and development, reduced mature let-7 levels contribute to uncontrolled growth in cancer. We hypothesis that small molecules can be discovered that interfere with LIN28-let-7 binding which would then allow mature tumor-suppressive let-7 to be produced. A library of FDA approved compounds will be tested for their ability to disrupt the let-7-LIN28 interactions in a high-throughput screen using a fluorescent polarization assay. Positive hits will be examined in cell culture and eventually chemically refined in an attempt to increase affinity. The crystallography structure of LIN28 bound to let-7 has been solved and shows a large binding pocket that recognizes a GGAG motif found in all let-7 family members. Modeling in silico has resulted in several small molecules that mimic the GGAG structure. These rationally designed small molecules will also be tested using the fluorescent polarization assay.

Life Science

Poster Number 266: Katie Wong

Regulation of Early Breast Cancer Migration by 1,25 Dihydroxyvitamin D

Breast cancer is the second most common cause of cancer deaths in US women, killing about 40,450 women each year. In addition, the five-year survival rate for breast cancer drops from 99% in Stage I to 22% in Stage IV, once the cancer has metastasized. We now know that metastasis to distal sites can occur in early cancer development, even before a tumor is identified. Therefore, it is necessary to identify safe and non-toxic methods to prevent early metastatic behavior as well as later metastasis from occurring. The active form of vitamin D, 1,25-dihydroxyvitamin D (1,25(OH)2D), is proposed to be preventive against the development of many cancers, including breast cancer, but the mechanisms remain unclear. Epidemiological evidence suggests that vitamin D may be a preventive dietary factor for cancer metastasis. For example, more advanced cancer (metastatic disease) is associated with vitamin D deficiency. Work in our laboratory shows that the active form of vitamin D, 1,25 dihydroxyvitamin D (1,25(OH)2D), inhibits metastasis as well as energy metabolism, such as glucose and fatty acids, to potentially limit energy in early breast cancer progression in cell culture models. Pyruvate is a key intersection in the network of metabolic pathways of glucose and fatty acids, and migration is an early step of metastasis that requires excess energy. Therefore, we hypothesize that 1,25(OH)2D treatment will inhibit migration of transformed breast cancer cells, while pyruvate will increase migration even in the presence of 1,25(OH)2D. In our studies, we employ breast cells which express the ras oncogene, which is a model of early breast cancer. We tested the effect of 1,25(OH)2D on migration, using a wound healing assay, in the presence or absence of pyruvate. Once the mechanisms by which 1,25(OH)2D inhibits metastasis is identified, prevention strategies, including dietary recommendations for vitamin D, can be explored to target this pathway to prevent metastasis.

Life Science

Poster Number 267: Eder Xhako

Importance of nuclear localization of an Agrobacterium virulence effector protein for transformation

VirE2 is a protein in agrobacteria that has many important functions in gene transfer from bacteria to plants. Previous experiments show that VirE2 has single stranded binding activity and that it is important in the plant's role in T-DNA integration, however there are still many roles of VirE2 that are debated. One of these debates is whether VirE2 remains cytosolic or goes into the nucleus, and what effects the protein has on T-DNA integration. My research compared two mutant plant lines, one that expressed VirE2 and one that expressed VirE2-NLS, a VirE2 protein that is forced into the nucleus, and measured levels of T-DNA integration. The results showed that when VirE2 is forced into the nucleus (VirE2-NLS mutants), the integration levels are significantly lower than integration levels of VirE2 mutants. This suggests that not only does VirE2 have a role in integration, but that the role is in the cytoplasm of the plant cell, and not in the nucleus.

Mathematical/Computational Science

Poster Number 199: Caleb Belth

Using Deep Learning to Predict Binding Ligands and Drugs to Protein Targets

The structure of a protein determines its function and we can learn a lot about many proteins from predicting binding ligands. Thus, the task of predicting binding ligands given a binding site of a protein is important to fields such as biology and drug design which require knowledge of the function of proteins. In the field of machine learning, recent developments of enormous datasets and increases in computational power through the use of GPUs has made possible the successful development of deep convolutional neural networks for several tasks, including the task of classifying data into discrete classes. In our research, we are looking to use these developments in convolutional neural networks to improve the accuracy of classifying binding ligands in hopes of providing insight into protein structures with unknown function. We have already seen an improvement in prediction accuracy from previous prediction methods. We are currently working on improving our dataset and applying machine learning techniques to improve the performance of our model. Our results thus far are promising that the method of using deep convolutional neural networks could lead to a significant improvement in binding ligand predication.

Mathematical/Computational Science

Poster Number 206: Yu Ding, Jerry Michael

The relationship between movie budget and movie box sale

By collecting, sorting and analyzing the data, I found that
• Some movies losing money
• Producer needs to allocate funds well
• Unpopular movies could generate more money than popular movie relatively
• To make movie more successful
• Regression model shows
• If we want to maximize profits we should not be under a certain budget value
• After a certain point $1 in is less than $1 out

Mathematical/Computational Science

Poster Number 211: Adhijeet Gaurav

In-memory, Latch-free Data Structures

The project involves the implementation of an efficient and locks free Data Structure to implement range queries. The goal is to extend HashTable to have a Range Query function. This function will return all the elements in HashTable which are within the upper and lower bound argument provided in Range Query function. In a HashTable, it's difficult to maintain the relationship between elements since the key values are hashed. Therefore, we first thought of using skip list to implement this but we found it to be not that efficient. Then we moved on and decided to use a singly linked list to point an element to the next higher element in the HashTable, thus giving us a sequence of ascending order of HashTablebuckets. The use of a singly linked list here will help us to make our HashTable lock free. From different HashTable implementations out there, we are using the one which uses open addressing. For now, we are basing our code on Mintomic code which is the fastest lock free HashTableimplementation out there. However, for further optimization, we are also going to use seeds array which is an array sorted in ascending that will contain may be 1% (still, need to decide and implement) of the key values of HashTable. This will allow us to find our element which is just lesser than our lower bound of range query and the element which is just lesser than the upper bound of the range query. We will then find these two keys in our HashTable and using the singly linked list traversal, we will return our required set of elements.

Mathematical/Computational Science

Poster Number 223: Corinne Leopold

Analysis of Random Generation of Binary Trees

This project involves a simulation of random binary trees to observe the relationship between tree height and the number of possible binary trees that can be generated from a uniform probability distribution. We study the effect of increasing tree size on the number of possible binary trees, in which every possible binary tree has an equal probability of occurring at a given height. We develop a recurrence relation that is used to calculate the number of binary trees of height n, and then we proceed to recursively generate all possible trees of height n. Our simulation ultimately allows us to analyze the asymptotic properties of randomly generated binary trees as their height increases. Further analysis may be performed to observe the behavior of specific types of binary trees as their height increases.

Mathematical/Computational Science

Poster Number 243: Krutharth Rao

Unilateral Non Disclosure Agreements using a Bitcoin

We study the problem of realizing a unilateral Non Disclosure Agreement (NDA) in a two user Sender-Receiver setting where the trust between the
two users is enforced using a Bitcoin smart contract. The NDA is time-bound and any dishonesty on the part of the receiver,
by revealing the non-disclosable document, is penalized through the loss of Bitcoins. A watermarked version of the document is
transferred to the receiver, who during the protocol, uses his Bitcoin Signing-Key to obtain the document. In case of a dishonest
disclosure of the document by the receiver, the receiver's signing key gets revealed to the sender who has access to the revealed document.
The obtained signing key is used by the sender to penalize the receiver by transferring the funds from a previously committed
Time-Locked Bitcoin Deposit. In this work, we design a protocol named SmartNDA which realizes the solution and analyze it
by studying the different modules necessary for its implementation. We proceed to argue the security of the protocol in-terms of Universal
Composability and then report the results of the implementation of the protocol. From the performance evaluation, we observe that the designed
protocol is easy to deploy and fast to run.

Physical Science

Poster Number 194: Ahkiya Allen

The presence of a dog fosters positive facial expressions in children with autism

One of the major symptoms of autism spectrum disorder (ASD) is deficits in social interactions. It has been suggested that interactions with animals may improve social behavior in individuals with ASD. Research has suggested that the presence of an animal creates a warmer atmosphere, and makes the individuals seem more approachable. Animal-assisted intervention with individuals with autism is driven by the idea that by having an animal present, the individual will feel more comfortable interacting with others. In this study, we hypothesized that in the presence of an animal, children with ASD would display more positive facial expressions and less negative facial expressions than compared to a control condition with toys. At Children's Hospital Colorado, 47 children and adolescents with ASD participated in two 10-minute sessions of unstructured activities, one with a dog and the other with a marble ramp toy. Individuals were video-recorded during all sessions, and three one-minute segments were later randomly selected to code behaviors. We used the Observation of Human-Animal Interaction for Research (OHAIRE) coding system, which captures facial and verbal emotional display, social behaviors, interactions with dogs and control objects, and problem behaviors. Results showed that when in the presence of an animal, individuals smiled three times more (t = 7.170, p < .001), laughed five times more (t = 3.327, p = .002), and showed three times less negative facial expressions (t = 1.355, p > .05) than when they interacted with the toy. Overall, our results replicated what was found in previous studies.

Physical Science

Poster Number 196: Tyler Azbell

Cross-Conjugated Cobalt Organometallic Compounds

Cross-Conjugated Cobalt Organometallic Compounds
Tyler J. Azbell (tazbell@purdue.edu), Sean Natoli and Tong Ren*
Department of Chemistry, Purdue University, 560 Oval Drive, West Lafayette, Indiana 47906

Cross-conjugated molecular segments based on geminal-diethynylethene (abbreviated gem-DEE) have been explored to serve as molecular switches within nano-electronic devices. Despite recent advancements, few transition metal cross-conjugated complexes have been synthesized. Discussed in this presentation is a family of [CoIII(cyclam)] (cyclam = 1,4,8,11-tetraazacyclotetradecane) acetylide compounds, namely [Co(cyclam)(gem-DEE-H)Cl]Cl (1), [{Co(cyclam)(Cl)}2(Î¼-gem-DEE)]Cl2 (2), [{Co(cyclam)(Cl)}2(Î¼-gem-DEE)2]Cl2 (3), and [{Co(cyclam)(C2TMS)}2(Î¼-gem-DEE)]Cl2 (4), which includes the first bridged gem-DEE

organometallic complexes 2-4 to date. X-ray structures of 1-4 show minimal disturbance of the pseudo-octahedral CoIII core. Voltammetric analysis revealed a strong trans-influence with moderate interaction between Co centers in 2. DFT analysis of compounds 1-4 reveals extensive Ï€-dÏ€ mixing of the occupied orbitals, as well as interesting orbital interactions of the unoccupied orbitals which is used to rationalize the electrochemical behaviors of these systems. This work is supported by the National Science Foundation (CHE 1362214).

Physical Science

Poster Number 205: Emily DeFries, Michael Greenfield, George Barth, Jake Winters, Lauren Hoover

Understanding the role of soil erosion in the carbon budget: An analysis of the depth, amount, and source of carbon burial

Stable soil C is essential for healthy agroecosystems. Environmental and geomorphic variations (topography, rainfall, temperature) have a significant control on the magnitude and direction of erosion impact on C-dynamics which have implications for soil health and green house gas emissions. The current gap of knowledge is whether soil erosion facilitates carbon release to atmospheric CO_2 or sequesters it in the sediment. Stable carbon and nitrogen isotope signatures or buried soil in flood plains can help to determine the source of carbon and the degree of microbial recycling of nitrogen. A series of cores (~ 0-120 cm) along a hillslope in an agricultural watershed in Iowa (plateau to flood plain) were investigated for the depth and amount of C burial as well as isotopic indices of carbon source. My results show a uniform soil organic carbon (SOC) layer in the shallowest (0-25 cm) depths of all cores sampled, reflecting a agricultural till layer. Increases in SOC are evident below the till layer at progressively deeper depths specifically, cores in the flood plain and toe slope reveal historical deposition of upslope C by agricultural practices over the last 130 years. The soil C/N ratio within the till layer has a uniform value indicative of intense mixing and uniformity of source while below the till layer the ratio demonstrates a high C/N in pre-agriculture and mobilized soil. The stable C isotope values demonstrate large changes within the SOC at depth for each core, indicating that the lower portion of the SOC comes from wetter environments with original shrubs and cool season grasses while the mobilized C represent upslope well-drained environments dominated by C4 dry season grasses. Gaining insights into the role of soil in the carbon budget is essential because if the stable carbon is lost, it is extremely difficult and sometimes impossible to restore it.

Physical Science

Poster Number 208: Daniel Foster

Design of Hormone-loaded EC-HPMC Composite Films for Smart Precision Medicine

Within the last few years, there has been increasing interest in new ways of manufacturing tablets for tailor-made medications to patients. This has generated significant interest in industry and academia, creating a partnership focused on individualized medications. Under this interest, our approach was to formulate films and design tablets in a layer-by-layer fashion. Both the drug doses and release rates were controlled by slightly altering the make-up of polymer-based films. As a result, the bulk of this research centered on developing thin films from ethyl cellulose and hypromellose that could be used to provide a patient with a customized version of a drug based on their history and physical/genetic traits. Thin films containing progesterone were prepared with varying concentrations of ethyl cellulose and hypromellose. In order to ensure accurate data, the active pharmaceutical ingredient (API) and plasticizer concentrations were held constant through the entirety of the experiment. Once prepared, samples of the films were removed and analyzed using in vitro dissolution tests and an 85% 0.1 N hydrochloric acid (HCl)/15% ethanol solution. For this experiment, the dissolution solvent contained ethanol in an attempt to fully solubilize the progesterone contained within the film as ethanol is capable of dissolving progesterone at a quick rate, enabling dissolution tests to be conducted in a shorter period of time. Aliquots of this dissolution medium were then extracted at set intervals for five hours (every 30 minutes until the two hour mark, followed by 60 minute intervals) and HPLC was used to quantify the amount of progesterone release at each time interval. Using the data collected from the HPLC and Tukey HSD statistical analysis, it was concluded that ethyl cellulose had lowered the API release rates while hypromellose raised API release rates, indicating the functionality and potential for ethyl cellulose and hypromellose-based individualized medications.

Physical Science

Poster Number 219: Adam Kline

Partition Theory for Repeated Electronic Systems

The properties of molecules and nanoscale structures are in general difficult to calculate directly because of complex interactions between large numbers of electrons. Partition theory allows one to divide a system into smaller, more manageable â€œfragmentsâ€, whose electrons do not interact with electrons in other fragments. Instead, a unique, fictitious â€œpartition potentialâ€ is introduced whose net effect is to reproduce electronic interactions such that the total electronic density of the system is exact. Whereas Kohn-Sham DFT is uniquely suited to weakly correlated systems, partition theory is a framework which can be applied to both weakly correlated and strongly correlated systems. It has been successfully

applied within DFT to small systems such as homonuclear diatomics but has yet to be applied to infinite, repeated systems such as crystals. This work takes preliminary steps in this direction through the examination of periodic 1-D systems with non-interacting electrons. We are particularly interested in how the number of electrons in each fragment, also called fragment occupation, affects the partition potential, and therefore system properties as a whole. We recently discovered that in repeated homonuclear systems, there is a fragment occupation at which the partition potential becomes constant. At this critical fragment occupation, electrons behave the same inside the non-interacting framework as outside, suggesting that their mutual effects have disappeared, except in raising or lowering the system energy as a whole. The ubiquity of this effect in terms of system definition is of great interest, and is the primary focus of this work.

Physical Science

Poster Number 234: Connor Mohs, Alex Wade, Andrew Spring, Dalton Chaffee, Ryan Baker

Develop and Test Silicon Detectors for the High Luminosity Upgrade of the Large Hadron Collider

The Large Hadron Collider (LHC) at CERN is the preeminent place in the world for research in particle physics; most recently made famous by confirming the existence of the Higgs Boson in 2012. The next major upgrade of LHC, scheduled for 2023, will generate a higher particle flux than ever before. The goal of our research is to design, build, and test a configuration of light weight silicon detector modules that can withstand the additional heat caused by the higher particle flux. In order to achieve this goal, we need to develop both mechanical and thermal models of heat dissipation of possible low mass detector designs in SOLIDWORDS, and taken data from simulations to match with experimental data from physical testing. Currently we are developing a physical prototype to compare results with a computer simulation. Ultimately, we will determine an optimal shape and material composition to meet the needs of the LHC upgrade.

Physical Science

Poster Number 235: Aidan Moore

Effective Range of Neutrino Based Extra-Solar Communication

Toward the idea of creating an extra solar civilization and in light of the research ongoing at SETI, methods of communication between the stars have come under investigation. Electromagnetic radiation's tendency to be warped, interrupted, and degraded when crossing interstellar space makes them unsuitable for this task. Neutrinos would be ideal candidates for information carriers due to their extremely low interaction cross-sections, but no

method for receiving data encoded in a beam of neutrinos is currently known. However, it may be possible to send information via collimated neutrino beams by basing such a communication method on research that suggests a variance in the decay rate of radioisotopes with exposure to neutrinos. Using current terrestrial methods of generating neutrino beams, this research will explore the range capabilities of such a communication system. This involves finding the limiting factors, such as the spread of the beam, luminosity, and the sensitivity of the â€œreceiversâ€ and using these parameters to calculate the effective range. **Physical Science**

Poster Number 236: Connor Moore

Visualization of the Evolution of Prehistoric Birds and Horses

Understanding evolution is the key to deciphering the history of life on Earth. Creating evolutionary trees is the best way to visualize how a type of life has evolved, but this method often only focuses on a narrow group for a specific study and commonly does not incorporate geologic time. Using the Purdue visualization program Time Scale Creator that generates user-friendly geoscience graphics from databases, we created our own unique evolutionary trees, which utilize metadata. These trees synthesize data gathered from many different sources to create a more complete schematic of the physiological changes. In this poster, I use these databases and this new visualization method via diagrams of (1) the transitions from prehistoric birds to modern birds, and (2) the migrations and extinctions of horses and their relatives on different continents.

Physical Science

Poster Number 237: Rhianna Moore

Using Remote Sensing Data and Digital Elevation Models of a Glaciated Volcanic Complex as an Analog to Martian Environments

The nature of Marsâ€™ past climate has long been up for debate. Evidence of fluvial processes, such rivers and lakes, are identifiable and are widespread across the planet. However, there is also abundant evidence that ice sheets and glaciers covered much of the globe during Marsâ€™ early history. In order to understand Marsâ€™ past climate, it is important to determine morphological features that are identifiable by the environments in which they formed. This study looks at the Three Sisters, a glaciated volcanic complex in Oregon whose mineral composition is extremely similar to that of Mars. By using LIDAR data collected from the USGS, a high resolution Digital Elevation Model (DEM) was made of the area in ENVI. This DEM was then combined with satellite imagery in ArcGIS to map glacial morphologies and compare to aerial spectral data sets. The analysis of this DEM ultimately will allow for more accurate interpretations of the landscape. It will help to map out the flow and movement paths of the

glaciers and rocks they have picked up, as well as to predict where certain rock units or sediments to might be expected to accumulate. This research will ultimately be used to look at parallels on Mars, and how glacial environments interacted with its terrain and climate.

Physical Science

Poster Number 249: Dominic Sanchez

Developing Biomimetic Polymers from Mussels for Use as a Surgical Adhesive

The problem of creating a non-toxic surgical adhesive has not yet been completely solved, despite its high demand. Most commercial glues have problems setting under wet conditions, or pose a health risk, and the current surgical adhesives on the market have to counteract toxicity by reducing their strength. Mussels, however, may hold the answer to this problem, as they are able to strongly adhere to surfaces despite being in a wet environment. They use a polymer consisting of many different proteins, the most important being 3,4-dihydroxyphenylalanine. We use a monomer, 3,4-dihydroxystyrene, which is comparable in structure to the protein, to mimic its adhesive properties. Previous research has shown the ability of our polymer to adhere two pieces of wet pig skin, though the methodology produced varied results. In this project, we aim to develop a more precise and consistent method of quantitatively testing the adhesive properties of our polymer system on this biological substrate in order to more fully understand its ability as a surgical adhesive. Once this is developed, we will be able to tune the polymer concentration in order to maximize adhesion as well as compare its strength against commercially available adhesives in order to show its viability as a surgical glue.

Physical Science

Poster Number 251: Thomas Shriver

Determination of the NMR Relaxation Times of the SYK Protein Using CHARMM-based Molecular Dynamics Simulations

Syk (spleen tyrosine kinase) plays a key role in mediating the signaling pathway of B-cell antibodies through the use of its tandem SH2 domains which bind the phosphorylated tryosines of the immunoreceptor tyrosine-based activation motif (ITAM) found in the heterodimer of the transmembrane proteins immunoglobulin-alpha (IgA) and immunoglobulin-beta (IgB) which directly interact with the B-cell receptor (BCR). Given SYK's pivotal role in mediating signal transduction between the BCR and other downstream, gene-regulating proteins, understanding the allosteric, phosphotyrosine regulation of SYK is a key focus of the Post Group. Using molecular dynamics simulations carried out with CHARMM, the N-terminal SH2 domain was

properly solvated to physiological conditions and a conical equilibration production was run. From this production data, the NH vectors were used to compose a correlation function G(t) which was then Fourrier transformed into the spectral distribution function J(w). The correlation time was then obtained from the plot of the spectral distribution against the larmor frequency and used to determine the spin-lattice (T1) and spin-spin (T2) relaxation times. These relaxation times were then used to validate the experimental NMR data already obtained by the group and confirm the accuracy of the MD simulations in depicting accurate in vitro behavior. Future work will involve the MD simulation of the phosphorylated SYK construct in order to determine the affects of allosteric regulation on the protein's dynamic behavior.

Physical Science

Poster Number 252: Vani Singhania

INFLUENCE OF MOLECULAR WEIGHTS ON CHARGE TRANSPORT PROPERTIES IN COMPLEMENTARY SEMICONDUCTING POLYMER BLENDS

Molecular weight plays an important role in polymer's physical properties. It also impacts the morphology of corresponding thin films. This project is aimed to study the effect of molecular weights on the electronic performance of the donor-acceptor type semiconducting polymer, poly(diketopyrrolopyrrole-co-thienothiophene) (DPP-TT) and its complementary semiconducting polymer blends.
DPP-TT was synthesized using Stille coupling polymerization. Recycling gel permeation chromatography was utilized to fraction the polymer into different molecular weights. The obtained fractions were characterized using gel permeation chromatography (GPC), UV-Vis spectroscopy, and nuclear magnetic resonance (NMR) spectroscopy. Organic field-effect transistors were fabricated with these polymers and their blends.

Physical Science

Poster Number 262: Megan Varcie

Evaluation of Doppler-Based Tornado Warnings

An investigation has been completed to examine the performance of Doppler-based tornado warnings compared to tornado occurrences. The National Weather Service (NWS) office in Indianapolis (KIND) was chosen to conduct a four-year preliminary study (2013-2016) that evaluates the success of Doppler-based tornado warnings. Out of the 125 tornado warnings issued by the Indianapolis NWS, 112 were Doppler-based tornado warnings. During this time period, there was a total of 36 tornadoes, where 23 of these received Doppler-based tornado warnings. Therefore the false alarm ratio for the Indianapolis domain was 79% (89/112) which compares to the national average of approximately 75%. Furthermore, 64% (23/36) of tornado

events in the Indianapolis NWS region were successfully warned using a Doppler-based tornado warning. The success of tornado warning performance of the NWS office in Indianapolis, based on this study, is comparable to the national average; however, additional years of data analysis must be completed to form a more robust statistical study.

Physical Science

Poster Number 268: Meng Xia

Not Decided

Not Decided

Physical Science

Poster Number 269: Jexiong Xu, Alexander J Wade, Tristan D Schefke, Joshua Leeman

Develop and Simulate Silicon Detectors for the high luminosity upgrade of the large hadron collider

The Large Hadron Collider (LHC) at CERN is the preeminent place in the world for research in particle physics; most recently made famous by confirming the existence of the Higgs Boson in 2012. The next major upgrade of LHC, scheduled for 2023, will generate a higher particle flux than ever before. The goal of our research is to design, build, and test a configuration of light weight silicon detector modules that can withstand the additional heat caused by the higher particle flux. In order to achieve this goal, we need to develop both mechanical and thermal models of heat dissipation of possible low mass detector designs in SOLIDWORDS, and taken data from simulations to match with experimental data from physical testing. Currently we have developed a basic thermal simulation to compare with physical testing, while the physical prototype is still being developed. Ultimately, we will determine an optimal shape and material composition to meet the needs of the LHC upgrade.

Social Science/Humanities

Poster Number 193: Anthony Adams

Maltreatment and its Effects on Adolescent Aggressive Behavior

Adolescents exposed to maltreatment (abuse and neglect) by caregivers and other adults are more likely to behave aggressively. These aggressive behaviors may be expressed differently, for
example, through physical or verbal actions. These behaviors also may have different trajectories
due to developmental stage and relevant ongoing experiences in adolescence. Using data from

the National Survey of Child and Adolescent Well-Being (NSCAW), a longitudinal study which surveyed 2,776 subjects between the ages of 11-17 who were in contact with Child Protective Services for possible maltreatment, we developed measure for four types of aggressive behaviors
(physical, verbal, sexual toward others and physical toward property) using confirmatory factor analysis. Trajectory models were estimated to determine the pattern of change for each aggressive behavior type between age 11 and 17. Most forms of aggression remain stable in adolescents, but verbal aggression increases in middle adolescence. Some sex differences exist and the different types of aggression trajectories are correlated. This study will go further into looking at children in maladaptive homes to determine which maltreatment types are associates
with different forms of aggressive behaviors and changes in those behaviors.

Social Science/Humanities

Poster Number 232: Mackenzie McGrath, Stacia Braden, Julia Bergman, Casie Blair, Nikole Miller

Pilot Study of a New COgnitive-based BALance Training in Older Adults with and without Parkinson's Disease

Individuals with Parkinson's disease often struggle with maintaining their posture and balance, especially while concurrently performing cognitive and balance tasks (e.g. walking and talking). Current interventions do not aim to simultaneously improve cognition and balance; however, COgnitive-based BALance Training (COBALT) targets both with the intention of improving quality of life and increasing independence in participants. The 12-week study involved training older adults both with and without Parkinson's disease using one of three interventions: cognition-only training, balance-only training, or COBALT. The subjects participated in pre-training and post-training assessments that included recording speech samples while they performed gait and fitting tasks. They also completed a variety of neurologic, cognitive, and psychological tests, such as the Unified Parkinson Disease Rating Scale (UPDRS), the Rivermead Behavioral Memory Test (RBMT-3), and Beck's Depression Inventory. Training effects were tested pre and post in multitask situations. Speech measures included the length and number of pauses and sound pressure level (SPL). Gait speed, balance stability, and reaching kinematics were also assessed. Initial results show the largest improvements in gait, balance, and cognitive assessments in older adults and those with Parkinson's disease after COBALT training, and smaller improvements in subjects after cognitive-only and balance-only training. COBALT shows promise as an effective treatment, and a future goal is to adapt it to be a training method used in home rehabilitation.

Social Science/Humanities

Poster Number 248: Sasmita Rout

Relationship between Disturbed Sleep and Obesity in Midwestern Latino Adolescents

Obesity has been associated with insufficient sleep in children and adolescents. This poster will use data from Project SALUD, a study of 119 adolescent Latinos in the Greater Lafayette area and surrounding counties. In this poster we will compare sleep data from several sources and their association with child obesity. We will use parent report sleep hours, child report sleep hours, and an objective measurement of sleep hours from two nights of adolescents wearing FitBit devices. We will also compare sleep on school nights to sleep on weekends, and how they each relate to obesity prevalence.

Innovative Technology/Entrepreneurship/Design

Poster Number 273: Leeane Chen

Purdue Orbital

Serving as the founding marketing and business development manager of Purdue Orbital, I am working to accelerate the organization's mission of developing an alternative way to launch into orbit.

Currently, satellites are tacked onto larger rockets and then launched into space; however, this process is extremely costly, time-consuming, and unreliable because satellites are the first to be removed if any problems arise. Launching satellites directly from the ground is even more costly in terms of time, energy, and money that it is nearly infeasible.

Currently the technology exists to support an alternative satellite launching development. Spire, a satellite powered data company, has developed first class satellite communication technology into incredibly small satellites known as cube satellites. And Lockheed Martin, an American global aerospace, defense, security and advanced technologies company, has developed an application to transmit and relay the information from the satellites to be utilized by consumers. Thus, the satellites and technology to utilize the information from these satellites exist; the only missing link is a reliable way for these satellites to get into orbit.

With my involvement with Purdue Orbital, we are working towards a new research initiative to develop an elevated balloon platform as an alternative method for launching these satellites in a cost-effective and reliable way.

I'm excited to be part of this process and join the Purdue Orbital team in their unprecedented research efforts for developing an elevated balloon-launching platform. My goals for creating new knowledge is to learn more within the realm of aerospace engineering from the nature of the project as well as through collaboration with fellow students on interdisciplinary teams. As the marketing and business development manager, I plan to accelerate the progress of this research initiative as well as increase the funding

Mathematical/Computational Science

Poster Number 275: Andrew Lentz, Kartik Shrivastava, Surya Gundavarapu

Using Machine Learning to Better Understand Price Sensitivity

This study examines and compares various machine learning models to estimate how price sensitive a set of similar products are. These more sophisticated techniques are compared to a traditional log-log model that is often used to gauge price elasticity. Understanding price sensitivity is a vital component to business. Overpricing products or services will lead consumers to search elsewhere. Underpricing will lead to lost potential margin and profit which are critical key performance measures. Our research questions entail: (1) do machine learning methodologies lead to similar price elasticity estimates compared to traditional models? (2) does the assumption of a constant or nonlinear price-demand relationship really make a difference when evaluating how price sensitive a product really is? (3) Can a machine learning approach to price elasticity provide better decision-support to a pricing or category manager than off-the-shelf pricing tools? We provide answers to these questions using a product category dataset provided by a national retailer.

Social Science/Humanities

Poster Number 272: Oswin Chakochan

Can a two day Agricultural experience impact students to enter into the Agriculture industry after graduation?

Each year, only about half of the new jobs created in the Agriculture industry get filled. A majority of the positions created are for individuals with a business degree, specifically management. Being a business student, I never thought of a career in Agriculture until I did a year long internship with an Ag company. Students in Krannert and the College of Agriculture participated in a two-day case competition sponsored by Land O'Lakes, inc. My research is designed to see if students with little previous Agriculture exposure can be inspired to have a career in Agriculture after graduation after visiting a farm, a Coop, and participating in a case competition.

Krannert School of Management

Social Science/Humanities

Poster Number 274: Brinna Gieseler

Examining Sick Leave and Maternity Leave in the United States and France

In spring 2016 I studied abroad in France and I noticed that the French are much more lenient than Americans when it comes to taking their sick days. Americans have very poor sick leave policies to begin with, but we also tend not to use our sick days, which can just make our coworkers sick with us. This is a huge problem. I hope to find ways America and/or France can improve their policies to benefit employees and their businesses, or be able to see how these policies are helping/hurting current businesses. Are employees more likely to choose a job because of the sick/maternity leave policies they offer? Have they left positions because of the lack of solid sick/maternity leave policies? I feel that it's important to see why this is happening since having a lack of sick/maternity leave policies doesn't do any good for America.
To complete this project I've studied the differences between the sick leave policies in the US and France. This has also included talking about maternity leave because in other countries sick leave and maternity leave overlap, but in the US they tend to be separate. I have surveyed people in both France and the US asking them about their current and previous experiences with sick leave and maternity leave and what they think about it.

Social Science/Humanities

Poster Number 276: Sarah Riddle

The Effects of Increased Tutor-to-Tutor Interaction within Purdue University's Writing Lab

In the writing center community, scholars have become increasingly interested in how to create an engaging environment for student tutors. Some topics that are commonly researched in the community include how to create an inviting space, how to provide impactful, ongoing training sessions, and how to utilize classroom knowledge in the writing center. While these topics are important to research, I have found a gap in research regarding the creation and maintenance of tutor-to-tutor relationships within writing centers. Mentorship program development within the workplace is proving to be increasingly important for improving employee recruitment, retention, engagement, confidence and performance. In this paper, I will construct a plan to implement an effective graduate-to-undergraduate mentorship, and, upon implementation, I will analyze its impact on tutors' perceived performance and job satisfaction. The study of relationships and their impact on company culture is not a novel realm of study; however,

through my precursory research, the topic does not appear to be formally applied to any college writing center. Through implementing a well-constructed mentorship program, I plan to monitor its effectiveness by monitoring cultural change within Purdue University's Writing Lab through conducting focus groups, surveys, and interviews.

Social Science/Humanities

Poster Number 277: Oean Wells

The Nighttime Economy: Do longer business hours make people richer?

In America, the average business is open from 9 AM to 5 PM, utilizing only 8 hours of a day. However, nighttime economies can utilize the evening from 5 PM to 12 AM at midnight, even going to 4 AM or often remaining open a full 24 hours. Nighttime economies refer to special zones within cities that allow businesses such as bars, venues, and restaurants to stay open for most if not all of the night. These economies supply new jobs and also create outlets for creativity and innovation. The aim of this study is to determine if longer business hours in an area lead to higher average incomes in that area. Longer business hours lead to more money spent, this leads to higher demand leading to higher prices and more jobs, and finally higher average incomes in that area. Using regression analysis, business hours will be tested on average income, ceteris paribus.

Innovative Technology/Entrepreneurship/Design

Poster Number 278: Sangjun Eom, Hope O'Connor

Robot Vision and Representation: Creating an immersive experience to see the world like a machine

Sentient machines operate with a logic based on a binary system of 1s and 0s. This is somewhat different from how humans interpret and see the world. In order to successfully shape the future development of machines with vision capabilities, it is important for humans to understand how such machines see their environment. In this work, we are creating an immersive Virtual Reality experience based on data collected by a robot that allows visitors to see the world like a machine using an Oculus Rift headset. We are currently working with an iRobot Create robot platform to visualize the robot's perception of its environment through two different types of maps:
1. A two-dimensional map representing the history of the robot's movement path.
2. A three-dimensional map of the environment in the robot's current location.

Maps, since their beginning, visualize the world around us. Over time maps have combined artistic and cultural aspects for representation and technological and scientific aspects for accuracy on the geographical/geological area. Now in digital form, our quest to map the world has become even more important. It can be argued that the future of our most ubiquitous electronic devices such as phones, computers, and self-driving cars will rely on digital maps. Using artistic and technical approaches to the visualization of iRobot Create platform's pathway, it is our goal to help humans understand better the possibilities and pitfalls in the perception and representation of specific places by machines.

Innovative Technology/Entrepreneurship/Design

Poster Number 279: Sangjun Eom

Smart Tupperware: Shape Deposition Manufacturing of Zero-Power Displays

Imagine you are in a house where almost every product is interconnected to each other by wireless communication and able to control many household features through home automation. The kitchen is the nerve center of many households and smart surfaces abound. Tupperware containers are instrumented with custom electronics to determine food type, amount, and condition. Sensors, networks, and active displays all come together to bring the ability of Smart Tupperware to display information to the user in extremely low power and robust manner. With a local network as a base station, Internet of Things technology will enable Smart Tupperware to communicate, via the internet, with other Smart Tupperware around the world. The system will become a part of Smart Home to update the information about the contents to the user through a smart phone or connect to a smart refrigerator or thermostat to control the temperature and humidity of containers. It is our goal to establish an extensive smart system in the kitchen to enhance the kitchen actuation with Smart Tupperware and change how customers of Tupperware containers think about food storage and food safety.

Innovative Technology/Entrepreneurship/Design

Poster Number 280: Ashley Jones, Po-yu Chou

Evaluation of Electrical Nose System and Quality Analysis

Those who constantly surrounded by air pollution can suffer heart disease and lung cancer. However, people are often faced with respiratory diseases like asthma. The goal of this project is to evaluate the technology of the electrical nose system. This system uses gases from sources that have very little air pollution like West Layette, Indiana and a laboratory create air pollution for alcohol, ammonia, and carbon dioxide. I would collect samples from West Layette and each cycle would be approximately 28 seconds and it would cycle through five times. We will create

simulated air pollution to cycle the same amount of time. As a result, the system would be able to compare humanity, temperate, and the concentrate of substances. The electrical nose system will be able to detect air pollution and compare how much of substance is in the air, from there others will be able to tell how dangerous the area is and will able to act on the problem. This system is to not only raise awareness of air pollution in the area, but keep the population safe from harmful chemicals.

Purdue Polytechnic Institute

Innovative Technology/Entrepreneurship/Design

Poster Number 281: Walter Kruger

Development of an interactive bouldering wall

Purdue University has various climbing walls in its recreational facilities. These are widely used by students and external people interested in rock climbing. These wall's paths have to be changed and reorganised throughout the year for them to still be entertaining to climbers. This project seeks to implement user input, sensors, and lights in these climbing walls to offer different paths to climbers without the need of physically changing them.

Innovative Technology/Entrepreneurship/Design

Poster Number 282: Drake Long

The Design of In-Vehicle Information Systems & Head-Up Displays

The interface design of In-Vehicle information system (IVIS) is an important research topic in the area of driving behavior and safety. As car head-up displays become more prominent, finding the most efficient design is difficult. Through secondary research, high-fidelity prototypes are being built. These prototypes will go on to be tested for efficiency, safety, and responsiveness.

Innovative Technology/Entrepreneurship/Design

Poster Number 283: Biulia Olivieri, Bridget Krumholz

Lipidomic platform for mass spectrometry Analysis of Mycobacterium/Mycobacteriophage system

The genus Mycobacterium includes over 100 species which may be nonpathogenic such as M. smegmatis or Â pathogenic such as Mycobacterium tuberculosis (Mtb).The characterization of bacterial physiology is receiving a renewed interest after the evolution of Â the novel Â

synthetic biology tools and the increased commercial use of bacterias in different fields of biotechnology. Mass spectrometry (MS) is one of the key analytical technology used for the detection and quantification of lipids, proteins, and metabolites.

This research project is interested in the study of Quorum Sensing, regulation of gene expression in response to fluctuation in cell-population density. Understanding of Quorum sensing can enhance the efficiency and effectiveness of new biotechnology products. M.smeg is a model species for M.tuberculosis, it has a unique cell wall composition that promises unique lipidomics discovery, novel from other model bacterial species.The proposed project aims to use MS to run a wide scan of M.smeg lipids in hope to find specific regulatory elements that is essential for M.smeg communication.

Innovative Technology/Entrepreneurship/Design

Poster Number 284: Jee Hwan Park

Development of a Robotic Water and Sediment Sampling System

Rivers are one of the most important natural resources to conserve. They provide water not only for drinking but also for recreational and commercial opportunities such as power generation, farming, and factory operation. However, rivers are prone to the contamination due to hazardous chemicals or sewer overflows from urban, industrial and agricultural sites. River monitoring is necessary to supply clean water to humans, animals and plants. Current monitoring system is mainly done by human. However, sampling process can be dangerous in fast flow river stream or in contaminated river. In order to overcome the problems and reduce the risk, we present sediment sampling robot. The robot uses rotation and linear motion to collect the sediment. Closed loop stability control and speed control of the rotation and linear motion was implemented in the robot. The robot uses four thrusters, which are aligned with center of gravity, to maintain the stability of the robot. The stability was maintained by using four force sensors placed at the bottom of the robot and an accelerometer. The control will help robot to sample different types of embedded materials for further study of underwater sediment.

Innovative Technology/Entrepreneurship/Design

Poster Number 285: Carrie Rogers, Lauren Brown, Yuwei He, Lihini Dias, Lipu Wu, Eric Lipps, Matthew Schnell

The Benefits of Employing Undergraduate Teaching Assistants to Support Instructors within an Active Learning Environment

Design Thinking in Technology (Tech 120) is a mandatory entry level course for all Purdue Polytechnic Institute students in which they engage in critical analysis of real world problems

and global challenges. Over the past five years, this course has undergone continual evolution to better meet the learning needs of students. One of the impactful classroom changes has been the employment of previous Design Thinking in Technology students - now sophomores, juniors, and seniors - in the role of undergraduate teaching assistants (UGTAs) to supplement the classroom instruction. This has the benefit of decreasing the classroom student to instructor ratio, bringing a holistic view to the traditional student and instructor roles, and allowing current Design Thinking in Technology students to foster relationships with a peer instructor that some students feel more comfortable engaging. This presentation highlights the roles of the UGTAâ€™s in the classroom and identifies instructional benefits from the perspective of the UGTA students.

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