MICHIGAN STATE UNIVERSITY

MID-SURE

Mid-Michigan Symposium for Undergraduate Research Experiences

JULY 26, 2017

WELCOME

Thank you for attending the 2017 Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE) at Michigan State University. Our goal is to provide a forum for undergraduates in the region to share and discuss their research as well as create networking opportunities with graduate schools and researchers.

Undergraduate students from diverse academic disciplines will present their outstanding research and creative endeavors at Mid-SURE. Approximately 380 students from 117 different institutions are participating in today's event. These students are mentored by 405 faculty members, post-doctoral researchers, and graduate students.

As one of the nation's leading research institutions, MSU offers a breadth of experiences and opportunities that actively engage students in their education. Through undergraduate research and creative activities, students work closely with leading scholars to gain in-depth knowledge about their fields of study and have opportunities to apply classroom learning to real-life situations.

We encourage the student participants, faculty members, research mentors, and guests to walk around the forum and learn about the impressive work of our next generation of scholars and researchers. Thank you for joining us.

MID-SURE PLANNING COMMITTEE

Lizzy King
Assistant Director, Undergraduate Research

Korine Steinke Wawrzynski
Assistant Dean, Academic Initiatives &
Director, Undergraduate Research

Judi Brown Clarke
Diversity Director, BEACON

Katy Luchini Colbry
Director, Engineering Graduate Initiatives &
Coordinator, EnSURE

Elahé Crockett
REPID Program Director

Steven D. Thomas
Program Manager, The Graduate School

Brendan Butcher
Student Assistant, Undergraduate Research

Cover image designed by Natalia Tortora, BFA Graphic Design.

UNDERGRADUATE RESEARCH AT MSU

MSU UNDERGRADUATE RESEARCH INITIATIVE

Michigan State University's **Undergraduate Research Initiative** strives to increase opportunities for students to engage in research, scholarship, and creative activity and expand the pool of faculty and partners engaging students in their scholarly work. The Undergraduate Research Office annually disperses undergraduate research grants, sponsors professional development workshops, awards undergraduate research travel grants, and creates materials to promote undergraduate research. The office sponsors two undergraduate research forums annually: the University Undergraduate Research and Arts Forum (UURAF), held each April, and Mid-SURE, held each summer. For more information about MSU's undergraduate research initiative, visit urca.msu.edu.

PARTNER PROGRAMS

Mid-SURE is a collaborative effort between the Undergraduate Research Office, BEACON, EnSURE, REPID, and SROP. Program descriptions and contact information are provided below.

BEACON

The **BEACON Center for the Study of Evolution in Action** approaches evolution in an innovative way, bringing together biologists, computer scientists, and engineers to study evolution as it happens and apply this knowledge to solve real-world problems. BEACON is an NSF Science and Technology Center, headquartered at Michigan State University with partners at North Carolina A & T State University, University of Idaho, University of Texas at Austin, and University of Washington. For more information about undergraduate research opportunities in BEACON, contact Dr. Judi Brown Clarke, Diversity Director, at jbc@msu.edu.

ENGINEERING SUMMER UNDERGRADUATE RESEARCH EXPERIENCE

The Michigan State University College of Engineering sponsors **EnSURE,** which is designed to engage high achieving students in faculty-mentored research. Students are paired with faculty in one of eight engineering departments and engage in 10 weeks of full-time research activities, ranging from "bench science" in a laboratory to on-site fieldwork and computational modeling. Students are exposed to a variety of research activities and participate in weekly professional development activities designed to help students understand and prepare for graduate studies. For more information, contact Dr. Katy Luchini Colbry, Director of Graduate Initiatives and Coordinator of EnSURE, at colbryka@msu.edu.

REPID PROGRAM

The **Research Education Program to Increase Diversity in Health Researchers (REPID)** program provides research training and enrichment experience for MSU undergraduate, graduate, and medical health professional students from underrepresented, minority, and disadvantaged groups. The program aims to increase the number and diversity of researchers in health-related research by providing a supportive environment for accomplishment and advancement with the goal of preparing students to pursue research careers in cardiovascular, pulmonary and hematologic disciplines. REPID is funded through support from the National Heart, Lung, and Blood Institute. For more information, contact Dr. Elahé Crockett, Program Director, at repid@msu.edu, or visit www.repid.msu.edu.

SUMMER RESEARCH OPPORTUNITIES PROGRAM

The **Summer Research Opportunities Program (SROP)** is a gateway to graduate education at Michigan State University. The goal of the program is to increase the number of domestic under-represented students who wish to pursue graduate study. The program helps to prepare undergraduate students for graduate study through intensive research experiences with faculty mentors and professional development activities that give students a competitive advantage. For more information, contact Steven D. Thomas, Program Manager at the Graduate School, at deshawn@grd.msu.edu.

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SCHEDULE OF EVENTS

All events occur on the 4th floor of Spartan Stadium.

TIME	EVENT	LOCATION
11:00 AM – 1:00 PM	Presenter Registration	Huntington Club – 4th Floor Lobby
1:00 PM – 2:15 PM	Session A Presentations	Huntington Club – Main Floor
2:30 PM – 3:45 PM	Session B Presentations	Huntington Club – Main Floor
1:00 PM – 4:00 PM	Graduate School Fair	Huntington Club – Main Floor

Poster Presentation Schedule

Students will only be present at their poster during the following assigned times:

CATEGORY	SESSION A SECTIONS 1:00 – 2:15 PM	SESSION B SECTIONS 2:30 – 3:45 PM
Agriculture & Animal Science	1 & 2	3
Biochemistry & Microbiology	1 , 2, 3, 4, 5, & 6	7, 8, 9, 10, 11, & 12
Biosystems & Agricultural Engineering	1	2
Cell Biology, Genetics, & Genomics	1, 2, & 3	4, 5, 6, & 7
Chemical Engineering & Materials Sciences	1 & 2	3
Civil & Environmental Engineering	1	2
Computer Science & Engineering	1	2 & 3
Electrical & Computer Engineering	1	
Environmental Sciences & Natural Resources		1
Epidemiology & Public Health	1	2 & 3
Integrative Biology	1 & 2	3
Mechanical Engineering	1	
Physical & Mathematical Sciences	1, 2, & 3	4, 5, & 6
Social, Behavioral, & Economic Sciences	1, 2, & 3	4, 5, 6, & 7

GRADUATE SCHOOL FAIR

We are pleased to incorporate a graduate school fair into Mid-SURE. Students who are interested in pursuing graduate school are encouraged to connect with representatives from the following institutions/departments:

INSTITUTION	DEPARTMENT
Case Western Reserve University	Master of Engineering and Management
Michigan School of Professional Psychology	Office of Admissions
Michigan State University	Biomolecular Science Gateway (BMS)
Michigan State University	College of Engineering
Michigan State University	The Graduate School
Michigan State University	School of Pharmacology & Toxicology
Michigan Technological University	The Graduate School
Northwestern University	McCormick School of Engineering & Applied Science
Oakland University	Graduate School
University of Michigan	School of Public Health
Van Andel Institute	PhD Graduate Program

ABSTRACTS

Abstracts are organized by discipline and then by poster number within each category. An index of student presenters is located at the back of the program book.

AGRICULTURE & ANIMAL SCIENCE

DO NEST BOXES AND WILDFLOWER PLANTINGS INCREASE ABUNDANCE OF STEM NESTING BEES IN FARMLAND?
Elisabeth Anderson (Michigan State University), Julia Brokaw (Michigan State University), Lauren Gedlinske (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 1, 1:00 PM - 2:15 PM
Poster: 1
Mentor(s): Rufus Isaacs (Entomology), Logan Rowe (Entomology)

Bee communities require access to floral resources and suitable nesting sites to thrive. Blueberry farms depend on bees to pollinate flowers, but many farms offer few floral resources after crop bloom and limited nesting resources. Wildflower plantings established adjacent to commercial blueberry farms may enrich floral resources for bees throughout the season, while artificial nesting boxes can offer nesting habitat for bees. Over three years, the effect of these resources on the abundance of stem nesting wild bee populations was tested at blueberry farms by comparing new and mature pollinator conservation plantings to areas without this practice. In each location, a nest box containing various sizes of cardboard tubes, a wooden block, and natural reeds was installed. The number of nesting bees recovered from each box was found to be higher in the mature plantings, highlighting their value for supporting this guild of wild bees. In addition, bee substrate preference was assessed, revealing distinct preferences of these bees for particular nesting materials. To best understand populations of stem nesting bees, foraging bees were also sampled off of wildflowers in new plantings, mature plantings, and field margins. Floral enhancements were shown to increase abundance and diversity of wild stem nesting bees. Together, bees collected from nest boxes and foraging surveys show the abundance of stem nesting bees at each site. This research will allow us to better understand the habitat in which stem nesting species are most successful, as well as the optimal nesting resources to provide for them.

CHILDHOOD DIETARY DIVERSITY IN RWANDA
Ravon Bonds (University of Wisconsin Whitewater)
Category & Time: Agriculture and Animal Science, Section 1, 1:00 PM - 2:15 PM
Poster: 2
Mentor(s): Dave Weatherspoon (Agriculture, Food, and Resource Economics)

Malnutrition occurs when the body does not get enough nutrients, which can be a result of poor dietary habits or lack of food. This issue effects children worldwide and can lead to conditions such as stunting and wasting. Progress on the nutritional status of Rwandan children continues to be a significant issue. This project seeks to analyze the sex and nutritional status of a child through the variables stunting and wasting relative to the head of household's sex and educational level. The Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey will be utilized to analyze these variables as well as other variables which will be used to examine their access to food such as distance to food markets and food, expenditures and select Rwandan polices that focus on food or poverty. The sample included 4061 children, 5538 adult males and 1918 adult women from Rwanda. A least-squared regression will be used. Results from this paper will hopefully shed light on the need for higher education in regard to a child's well-being.

THE EFFECT OF BIOFUEL CROPPING SYSTEMS ON PREDATORY INSECT DIVERSITY AND ABUNDANCE
Corinne Fischer (Binghamton University)
Category & Time: Agriculture and Animal Science, Section 1, 1:00 PM - 2:15 PM
Poster: 3
Mentor(s): Bill Wills (Entomology)

Fields planted with monoculture row crops, such as corn and soy, are high ethanol-yielding plantings but have reduced plant diversity, which in turn reduces predatory insect diversity and abundance. Subsequently, landscapes dominated by monoculture row crops likely require greater chemical inputs to control pest populations than landscapes dominated by polyculture crops due to reduced natural predation by a diverse and abundant predator community. To explore how ground predator abundance and diversity changes across different biofuel crops with varying degrees of plant diversity, including corn, soy, mixed prairie, and switch grass, we sampled the established plots of the GLBRC BCSE fields in Michigan. We also examined the relationship between ground predator abundance in comparison to egg removal. If lower biofuel crop diversity negatively affects predatory insect diversity and abundance, then the lower the crop diversity, the lower the diversity and abundance of predatory insects, and the lower the rate of egg removal. We sampled three times during the 2017 growing season (June, July, and August), and set three pitfall samples per field, totaling 225 pitfalls. From each we recorded the number of ants, spiders, predatory beetles, orthopterans, slugs, mites, collembolans, and millipedes. We expect less diverse biofuel crop types to have lower predatory insect diversity and abundance. We also expect a positive correlation between ground predator and ant abundance on egg removal. These expected results would suggest lower plant diversity can limit the availability of important resources for ants and other arthropods, thus reducing their ability to provide ecosystem services.

COMPARISON OF LOW-OSMOLAR CONTRAST AGENTS IN A RABBIT MODEL OF CONTRAST INDUCED ACUTE KIDNEY INJURY
Brittney Haynes (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 1, 1:00 PM - 2:15 PM
Poster: 4
Mentor(s): Adam Lauver (Pharmacology & Toxicology)

Contrast-Induced Acute Kidney Injury (CIAKI) is a condition where damage to the kidney is caused by iodinated contrast media, which is used in various cardiovascular procedures like angiograms. While CIAKI is rare in the general population, it causes a monitoring burden in hospitals following any procedure that uses contrast media. CIAKI causes significant problems in people with existing kidney diseases however, and can even result in the need for dialysis and higher mortality rates. The mechanisms behind the kidney injury caused by the contrast are currently unknown. The purpose of this project is to test the difference in renal injury for multiple low-osmolar contrasts in a controlled environment. Rabbits are being used as a model for the human kidney because they reflect the clinical damage more accurately than rodents. The rabbits are administered contrast media over a period of 30 minutes at a constant rate. Blood and urine samples are collected before the infusion, and 1, 2, 24, and 48 hours after. The rabbits are then euthanized at the 48-hour mark and their kidneys harvested for future histological analysis. Creatinine and blood urea nitrogen will be used as markers of kidney function. From our results, we hope to identify contrast agents that are safer for clinical use.

EARLY LIFE ADVERSITY AFFECTS CHOLINERGIC DEVELOPMENT IN JUVENILE PIGLETS
Katelyn Kerr (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 1, 1:00 PM - 2:15 PM
Poster: 5
Mentor(s): Adam Moeser (Large Animal Clinical Sciences), Calvin Pohl (Large Animal Clinical Sciences)

Early life adversity (ELA) is known to increase risk of developing functional gastrointestinal disorders (FGIDs) later in life; however little is understood about the mechanism causing this phenomenon.1 Previously, we demonstrated that ELA, through early weaning induces long term up regulation of intestinal CHAT expression.2 CHAT is an enzyme that synthesizes acetylcholine, a neurotransmitter mediating enteric epithelial, immune, nerve, and muscle function.2 The enteric cholinergic system is developing in juvenile animals, and the immediate effects of stress, particularly weaning, on this development remain unknown. We investigated how weaning age affects progression of enteric CHAT expression in juvenile pigs. Utilizing western blot, we identified two CHAT isoforms, 83kDa and 55kDa. Expression of the 83kDa significantly increased with age: lowest values at 10 days and maximal expression at 70 days (our final time point). Regarding the 55kDa isoform, a significant decrease correlated with increased age. Maximal expression at 55kDa occurred at 10 days, with a significant reduction at 17 and 70 days. Weaning, at 17 days (early wean stress, EWS) and 26 days (later wean control, LWC), showed an increase in expression at 55kDa, 24 hours after weaning (18 and 27 days). The largest response to weaning was EWS pigs compared to LWC; there was no difference in expression of either isoform between EWS and LWC pigs at 70 days. These findings suggest a dynamic shift between two isoforms during juvenile development. Weaning up regulates CHAT expression, with earlier age inducing a larger increase. Expression is not affected by 70 days.

ASSESSMENT OF GLAUCOMATOUS OPTIC NERVE DAMAGE BY BLUE LIGHT CHROMATIC PUPILLOMETRY
Kuan-Ting Lin (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 1, 1:00 PM - 2:15 PM
Poster: 6
Mentor(s): Andras Komaromy (Small Animal Clinical Sciences)

Glaucoma is a leading cause of incurable vision loss in both humans and dogs. Increased intraocular pressure is a major risk factor that contributes to the death of retinal ganglion cells (RGCs) and degeneration of the optic nerve. One of the major challenges is the early diagnosis which would allow more effective therapy. In recent years, a subset of RGCs were identified as being intrinsically photosensitive (ipRGC) with a peak absorption spectrum in the blue (480nm). These cells are part of the non–image-forming visual system and play a role in regulation of pupil size and circadian rhythm. The purpose of our study was to determine if pupil constriction following a blue-light stimulus could serve as a screening method for glaucomatous optic nerve damage. We hypothesized that dogs affected by primary glaucoma have decreased pupillary responses to blue light. We tested 6 dogs at well-defined stages of glaucoma and 8 normal controls. We used a series of 4 1-sec blue light (480 nm) flashes with a brightness of 400 cd/m² (LKC RETeval). Pupillary responses were recorded with an infrared camera (RETeval). Relative changes in pupil diameter was measured and plotted as a function of time post blue light stimulus. Our preliminary data analysis did not reveal obvious differences in pupil constriction amplitudes and short-term post-stimulus pupil recovery between glaucoma-affected and control dogs. Our future plans include the comparison of postillumination pupil responses following red and blue light stimuli since they have been shown to be affected in human glaucoma patients.

HOW STRESS AFFECTS NEURONAL REGULATION OF NUTRIENT TRANSPORT IN THE SMALL INTESTINE
Karina Matos (University of Puerto Rico Ponce)
Category & Time: Agriculture and Animal Science, Section 2, 1:00 PM - 2:15 PM
Poster: 10
Mentor(s): Yihang Li (Large Animal Clinical Sciences), Adam Moeser (Large Animal Clinical Sciences)

Psychological stress increase the risk to develop gastrointestinal (G. I.) diseases, such as Irritable Bowel Syndrome and Inflammatory Bowel Disease. The onset of G. I. diseases later in life is tightly associated to early-life stress, but the underlying mechanisms are still poorly understood. Our study focuses on how stress affects neuronal regulation of nutrient transport in the small intestine.

MANUFACTURE AND ANALYSIS PROCESS OF FIBER-REINFORCED TQ3D COMPOSITES
Hoa Nguyen (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 2, 1:00 PM - 2:15 PM
Poster: 11
Mentor(s): Dahsin Liu (Mechanical Engineering), Wu Zhou (Mechanical Engineering)

The objective of this study is to design, analyze and construct a fiber-reinforced TQ3D (tri-axial quasi-three-dimensional) composite panel resembling a general automotive structure for achieving a high energy-deflection (E/d) ratio during automotive crash impact. Although a high energy absorption capability (E) and adequate deflection (d) are desired, a low mass of the structure is also of the primary focus of this proposed study. Hence, a high specific energy absorption capability (energy/mass) should be the design goal of a modern fiber-reinforced polymer-matrix composite structure. To meet the manufacturing requirement, the composite panel must be either compression moldable or injection moldable. In order to achieve such a goal, this study will take several cycles of investigation including review, analysis, design, manufacturing, and testing. All details of the proposed investigation for achieving a composite panel with high energy absorption capability.

INDIVIDUAL AND SOCIAL MOTIVATION IN BUMBLEBEE FORAGING
Solidad Nwakibu (Spelman College)
Category & Time: Agriculture and Animal Science, Section 2, 1:00 PM - 2:15 PM
Poster: 12
Mentor(s): Fred Dyer (Integrative Biology)

There is ample research on how social bees respond to changes in the quality of a food source, increasing intake when food gets better and decreasing intake when food gets worse. Less well studied is how intake may change when food quality stays constant. Bumble bees (*Bombus impatiens*) often show patterns of habituation to food of constant quality: seeming to lose interest in it after repeated visits. This resembles how solitary animals stop feeding when they are satiated, but the process in bumble bees is expressed on the social level, raising the question of what social, behavioral, and neural process underlie it. It is also a problem of economic importance because plant growers who use bumble bees for pollination often complain about the lack of motivation for the bees to forage on plants. This study will focus on two ways of influencing habituation to nectar rewards. First, we will test whether the amount and quality of food stored in a colony influences the rate of habituation of bees foraging on a constant food source. Secondly, we will test whether a pharmacological exposure to caffeine, a genetic stimulant of the central nervous system, will stimulate foraging activity on the bees that do show signs of habituation. Either of these might lead to improved management practices to ensure high motivation for pollinators used in agriculture.

SYNTHESIS OF LIGNIN DIMERS FOR STUDYING CLEAVAGE OF BETA-O-4 LINKAGES
Jacob Robbins (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 2, 1:00 PM - 2:15 PM
Poster: 13
Mentor(s): Pengchao Hao (Chemistry), James Jackson (Chemistry)

In the current global push to decrease human dependency on fossil fuels, biomass is one viable alternative energy source. The lignin component of biomass is of particular interest, because it is rich in carbon and energy, and despite many years of effort, it remains difficult to utilize with current technology. Abundant in wood and bark, lignin is a rigid, crosslinked polymer that provides stability for the plant structure. Formed in plant cell walls, lignin is composed of cross-linked phenolic monomers, connected with multiple types of linkages, making it resistant to biodegradation. This randomness in the linkages, and the variety in the types of monomers, make it difficult to disassemble lignin into its monomer building blocks. Given an efficient, general strategy to break these linkages, lignin could be converted into liquid hydrocarbons for fuel. In the search for an effective method to break down the lignin network, synthesis of lignin-relevant dimers is underway. Each dimer consists of two aromatic monomers connected by a beta-O-4 linkage, one of the most common types of linkages found in lignin. To find efficient methods to cleave their beta-O-4 linkages, chemical products and yields from electrocatalytic reduction and upgrading of these dimers are to be observed and measured as a function of catalyst preparation and reaction conditions.

CHARACTERIZATION OF THE EXPRESSION PROFILE OF WEEP, A GENE THAT REGULATES BRANCH ORIENTATION IN TREES
Elijah Saltzman (Oberlin College)
Category & Time: Agriculture and Animal Science, Section 3, 2:30 PM - 3:45 PM
Poster: 17
Mentor(s): Courtney Hollender (Horticulture)

A weeping branch phenotype in peach was recently found to be caused by a deletion in a previously uncharacterized gene, now named WEEP. WEEP is highly conserved throughout vascular plants on the protein level, and contains a sterile alpha motif (SAM), which is known to play a role in protein-protein and protein-DNA binding. Interestingly, Arabidopsis weep mutants showed no visible phenotype, yet expression was detected in wild type plants, suggesting it has a function in herbaceous plants. To begin to characterize its function in Arabidopsis, tissue-specific expression patterns of WEEP were studied using plants containing a pWEEP::GUS reporter construct. GUS staining patterns revealed that WEEP is highly expressed in developing shoots, flowers, and siliques. Additionally, expression changes in response to altered light and gravity conditions were investigated and a bioinformatic analysis of the WEEP promoter was performed.

PROGRESSION AND PERSISTENCE OF EOSINOPHILIC RHINITIS IN OZONE-EXPOSED RATS
Eden Teshome (George Mason University)
Category & Time: Agriculture and Animal Science, Section 3, 2:30 PM - 3:45 PM
Poster: 18
Mentor(s): Jack Harkema (Pathobiology and Diagnostic Investigation)

Epidemiological studies suggest that elevated ambient concentrations of ozone, the most common gaseous air pollutant in photochemical smog, are associated with activation of eosinophils in the nasal airways of children, a pathologic feature of both atopic and non-atopic rhinitis. Our laboratory has recently reported that rodents repeatedly exposed to ozone develop nasal eosinophilic inflammation, mucous cell metaplasia, and type 2 immunity that are all dependent on group 2 innate lymphoid cells. Progression and persistence of ozone-induced eosinophilic rhinitis after repeated inhalation exposures has not been previously investigated. The present study was designed to determine the severity of ozone-induced rhinitis in rats after episodic inhalation exposures to ozone over the course of 10 weeks. Male rats were exposed to 0 or 0.8ppm ozone (4 h/day) for 9 consecutive weekdays (2-week inhalation exposure). Other rats received three 2-week inhalation exposures separated by 2 weeks of no exposure. All rats were sacrificed 1day or 2 weeks after the last exposure day. Nasal tissues were processed for light microscopy, immunohistochemistry, and morphometry. Density of eosinophils in the nasal mucosa was significantly greater in rats that were exposed for three 2-week ozone exposures, as compared to those exposed for a single 2-week exposure. Ozone-induced eosinophilic rhinitis persisted for 2 weeks post-exposure with no significant change in severity. The results of this animal toxicology study suggest that eosinophilic rhinitis may progress with repeated episodic exposures to elevated levels of ambient ozone and that this may be a long-lasting adverse effect in humans.

DEVELOPMENT AND EVALUATION OF PINEAPPLE/TART CHERRY JUICE
Sierra Sese Tolbert (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 3, 2:30 PM - 3:45 PM
Poster: 19
Mentor(s): Siddiq Muhammad (Food Science & Human Nutrition)

Today, there are many varieties of fruit juices that provide diverse flavors and meet nutritional demands. The purpose of this project is to develop a new 100% natural product by blending the juice of pineapple and tart cherries. The pineapple and tart cherry juice will be extracted in the laboratory, with the addition of enzymes Pectinex and Celluclast. Such enzymes break down pectin, the plant cell wall, and allows further extraction (Sreenath and others, 1994). The benefits of Pectinase and Celluclast are that they improve clarity, flow, and increase juice yield (Liavoga and Matella, pg. 45). After extraction, the juices will then be filtered and combined in multiple ratios and evaluated compared to 100% pineapple and 100% tart cherry juice. The ratios are 50% of each fruit, 25% tart cherry and 75% pineapple juice, and 75% tart cherry juice and 25% pineapple juice. The specific variables of each juice blend that will be evaluated are total phenolic content, color, ascorbic acid, sensory, total soluble solids, clarity, and total acidity. With the combination of the two juices, it is inferred that the nutritional value will be enhanced as compared to that of individual juice alone. It is also hypothesized that blending two juice in different combination will also enhance their sensory quality and acceptability by consumers. It is also expected that some ratios will have a higher nutritional value than others. This is important because this new developed product, with no artificial additives, could potentially increase variety within all natural market.

UNDERSTANDING BARRIERS IN FARMER BEHAVIOR TO ADOPTING PRACTICES THAT INFLUENCE BIOSECURITY AND DECREASE ANTIMICROBIAL RESISTANCE
Kelsey Watson (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 3, 2:30 PM - 3:45 PM
Poster: 20
Mentor(s): Andrew Huff (Veterinary Medicine), Emily Huff (Forestry)

The effects of antimicrobial resistance (AMR) are becoming increasingly problematic with regards to human health. Increased antibiotic use in both the treatment of human ailments as well as in prophylaxis and growth promotion in animal husbandry has created an increase in the existence of bacteria and viruses that are resistant to the antibiotics available for human use. Our objective is to understand farmers decision making and beliefs regarding the use of antibiotics. We hypothesize that farmers with values, perceptions, and beliefs that reflect a comprehensive understanding of the risks of antimicrobial resistance will also demonstrate behaviors that minimize their perceived risks with biosecurity. A survey was designed to gauge farmer behavior and beliefs about biosecurity and antimicrobial resistance. Data will be collected during initial in-person interviews with farmers from around the state of Michigan, asking survey questions that give insight to behaviors that farmers make that have the potential to effect antimicrobial resistance and biosecurity on site. Quantitative data will be analyzed from the surveys and application responses. Qualitative data will be assessed using thematic analysis. We anticipate finding that analyzed responses will reveal farmers behaviors and beliefs to be indicators of AMR resistance overall. Analyzing AMR exposure risk and understanding why farmers have certain attitudes, values, and beliefs towards biosecurity measures will help determine new approaches to improving farm biosecurity, consequently decreasing human exposure levels to AMR bacteria.

TROPANE ALKALOID BIOSYNTHESIS AND DIVERSITY WITHIN SOLANACEAE
Tevin Williams (Saint Augustine's University)
Category & Time: Agriculture and Animal Science, Section 3, 2:30 PM - 3:45 PM
Poster: 21
Mentor(s): Cornelius Barry (Horticulture)

Plants are master chemists and collectively synthesize hundreds and thousands of specialized metabolites. Plants utilize these metabolites to defend themselves against pests and pathogens and to communicate with other organisms. Tropane alkaloids are a class of plant specialized metabolites of pharmaceutical importance that includes the narcotic cocaine, which is synthesized in the Erythroxylaceae and the medicines, hyoscyamine, and scopolamine that are synthesized in the Solanaceae. Roughly 200 tropane alkaloids structures are known in plants and they are synthesized through multistep pathways that are not fully understood. Studies in the Solanaceae family using the Atropa, Hyoscyamus, and Datura genera have led to the identification of several tropane alkaloids related genes and the availability of genome sequences for several members of the Solanaceae, including crop plants such as tomato, potato, and tobacco allow investigations into the evolution of tropane alkaloid biosynthesis across this family. Indeed, presence/absence variation of tropane related genes in the family correlates with the observed tropane alkaloid phenotype. In particular, plants of the Nicotiana (tobacco) genus appear to lack several genes required for tropane alkaloid biosynthesis. The Nicotiana genus is a large genus within the Solanaceae comprised of approximately 75 species. However, it is unknown whether all of these species lack the ability to synthesize tropanes and if so, at what steps in the pathway is tropane synthesis blocked. In this study, the ability of Nicotiana species from across the phylogeny to synthesize tropanes was determined by liquid chromatography mass spectrometry.

TURBULENT SIMULATIONS AND STRUCTURAL ANALYSIS
Jin Zhang (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 3, 2:30 PM - 3:45 PM
Poster: 22
Mentor(s): Junlin Yuan (Mechanical Engineering)

Wingtip vortices, mushroom cloud, and sea swirls are all coherent turbulent motions. Such motion contains most of the turbulence kinetic energy and play a large role in mass and momentum transport. It is of interest to study the evolution of these structures as they move and interact with each other. This study aimed to test techniques to track the coherent motions, and describe their shape evolution. For example, the change of shape of the coherent region can be highlighted when the vortical regions are translated and/or rotated, based on an optimization process to maximally correlate the motions at instantaneous times. The technique applied to the data of a numerical simulation of turbulent channel flow with wall roughness, with mathematically synthesized roughness that is physically resolved by the simulation. The vortical structures generated by roughness elements was tracked and their evolution described.

USING NEXT GENERATION SEQUENCING OF MITOCHONDRIAL GENOMES TO DEVELOP SPECIES DIAGNOSTICS FOR R. POMONELLA AND R. ZEPHYRIA
Nick Zonca (Michigan State University), Wanda Sankey (Michigan State University), Krista Dunger (Michigan State University)
Category & Time: Agriculture and Animal Science, Section 3, 2:30 PM - 3:45 PM
Poster: 23
Mentor(s): Dan Hulbert (Entomology), Jim Smith (Entomology)

R. pomonella is a pest in the apple industry that can cause millions of dollars of damage a year. R. zephyria only affects the inedible snowberry. However, these two species are visually identical. We used Next Generation Sequencing technology and sequenced multiple individuals complete mitogenomes in an attempt to develop a way to tell these species apart from a genetic basis. We looked for differences in the genetic code for these species and attempted to find species-specific sequences to establish a diagnostic test to be able to tell these maggots apart from one another. We currently have not found success using the full mitogenome but we are still conduction research on these maggots and other avenue of further research are always an option.

BIOCHEMISTRY & MOLECULAR BIOLOGY

HIGH VALUE TERPENOID PRODUCTION IN PHYSCOMITRELLA PATENS
Amanda Agosto Ramos (University of Puerto Rico Ro Piedras)
Category & Time: Biochemistry and Molecular Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 26
Mentor(s): Jonathan Arnesen (Biochemistry & Molecular Biology), Aparajita Banerjee (Biochemistry & Molecular Biology), Bjoern Hamberger (Biochemistry & Molecular Biology), Britta Hamberger (Biochemistry & Molecular Biology)

Terpenoids are the largest group of specialized metabolites found in plants. They play diverse roles including growth, development, defense, and adaptation. Some recognizable are β-carotene and rubber. The carotenoid astaxanthin, for example, is important in salmon pigmentation. Though not naturally available to farmed fish a synthetic version must be added to their diet. Synthesized terpenoids have high production cost and involve hazardous chemicals. Therefore, a biosustainable, high yield system would be beneficial. Physcomitrella patens (moss) has been used as a host for bio-production of terpenes. This primitive plant is a good candidate for production of diterpenes as it produces the precursor molecule geranyl geranyl diphosphate (GGPP) and has a simple diterpene profile. It is advantageous due to its ability to undergo homologous recombination, low production cost, and the possibility of up-scaling in a photo-bioreactor. Biotechnology

based production of terpenoids requires the knowledge of their biosynthetic pathways. Two important genes involved in the biosynthesis of astaxanthin have been identified from flowers of Adonis aestivalis. These genes have been synthesized and fused through a linker peptide gene. Moss was transformed with these genes along with a kanamycin selection marker and a constitutive promoter driving the expression of the astaxanthin pathway. Genotyping will be used to confirm the integration of the fragments. Ultimately, metabolite analysis will be performed to identify the desired compound. Other strains of transformed moss are also evaluated for the content of different terpenoids. The success of this system could lead to an advanced production platform for diterpenoids.

GLUTAMATE RECEPTORS AND EAAT2 ARE ALTERED IN A GENE-ENVIRONMENT INTERACTION MODEL OF AMYOTROPHIC LATERAL SCLEROSIS.
Coral del Mar Alicea-Pauneto (University of Puerto Rico at Humacao)
Category & Time: Biochemistry and Molecular Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 27
Mentor(s): Bill Atchison (Pharmacology & Toxicology), Jordan Bailey (Pharmacology & Toxicology)

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease that affects motor neurons of the brain and spinal cord. Previous work suggests that this disease is mediated via genetic and environmental influences, referred to as a gene-environment interaction. Exposure to methylmercury (MeHg), which is an environmental neurotoxicant, is known to result in some of the same cellular dysfunction associated with ALS (i.e. glutamate-mediated, calcium-induced excitotoxicity). However, the exact mechanisms by which a gene-environment interaction might result in excitotoxicity, and ultimately the symptoms of ALS, is not well understood. Here, a genetic model of ALS (SOD1G93A mice and their appropriate controls) and exposure to 3 PPM MeHg via drinking water is used to understand the relative contribution of post synaptic glutamate receptors and the astrocytic excitatory amino acid transporter 2 (EAAT2). Using immunohistochemistry, the fluorescence intensity of glutamate receptors and EAAT2 are measured in effort to understand how excitotoxicity may manifest under conditions that model a gene by environment interaction in ALS. Spinal cord tissue (lumbar section, ventral region) from adult mice (both sexes) of each genotype + MeHg-exposure group) was taken. Early results indicate greater abnormalities on these endpoints among the mice with both a genetic and environmental predisposition. The results of these experiments will significantly contribute to the understanding of mechanisms by which gene by environment interactions can manifest in the deleterious symptoms of ALS.

EXPRESSION OF INFLAMMATORY GENES IN CHILDREN WITH CEREBRAL PALSY
Brooke Armistead (Grand Valley State University)
Category & Time: Biochemistry and Molecular Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 28
Mentor(s): Sok Kean Khoo (Cell & Molecular Biology)

Cerebral palsy (CP) describes diverse conditions of life-long motor impairments that result from brain injuries in early childhood and fetal development. The main causes of CP are relatively unknown. Genes differentially expressed at birth in children who later develop CP could identify causal pathways of CP. Previously, microarray technology identified differentially expressed genes in four hypothesized pathways–inflammatory, hypoxic, coagulative, and thyroidal–from archived neonatal blood spots (NBS) of 33 term and 20 preterm children with CP, and 53 matched healthy controls (HC). Inflammatory gene sets were upregulated in preterm CP and downregulated in term CP, indicating differences in CP based on gestation age. We used quantitative real-time PCR to validate two differentially expressed inflammatory genes: S100 calcium binding protein A9 (S100A9) and ectonucleoside triphosphate diphosphohydrolase-1 (ENTPD1), in NBS of 22 preterm CP and 23 preterm HC. Markov Chain Monte Carlo simulation and ANCOVA tests were used for data normalization and statistical analysis. P-values of 0.319 and 0.433 were observed for S100A9 and ENTPD1. Future directions include investigation of S100A9, ENTPD1, and new inflammatory genes, tumor necrosis factor-alpha and tyrosine hydroxylase, in additional term and preterm samples. Differences in gene expression between term and preterm CP may provide insight to the cause of CP in different risk groups.

REPURPOSING AN AMINOMUTASE FROM TAXUS PLANTS: RING OPENING OF PHENYL THIIRANE TO PRODUCE PHENYLCYSTEINE
Jeshua Avila Estrada (California State University Dominguez Hills)
Category & Time: Biochemistry and Molecular Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 29
Mentor(s): Prakash Shee (Chemistry), Kevin Walker (Chemistry)

Chronic alcoholics are often diagnosed with elevated levels of blood acetaldehyde after consuming alcohol, causing hepatotoxicity and acetaldehydemia. Acetaldehyde is highly toxic, mutagenic, and carcinogenic. It is found to be active as a local and cumulative carcinogen in the upper digestive tract in humans. Phenylcysteines are an important class of organic compounds that are potent towards sequestering metabolically-generated acetaldehyde when ethanol is oxidized in vivo. In addition, phenylcysteines are also used in Native Chemical Ligation (NCL) for the synthetic preparation of biologically important peptides and protein targets. NCL normally is limited to an N-terminal cysteine residue on one peptide chain. Access to novel cysteines, such as phenylcysteine overcomes this limitation. In this work, we co-opted a Taxus canadensis (2S)-α- to (3R)-β-phenylalanine isomerase (TcPAM) from the biosynthetic pathway of the anticancer drug paclitaxel. We used TcPAM as a transaminase to biocatalyze the production of phenylcysteines from the corresponding thiiranes. This enzyme was previously repurposed to transfer -NH2 from styrylalanine to cinnamate epoxide to make d- and l-erythro-phenylserine. This work involves exploring the transaminase activity of TcPAM with phenylthiiranes, mercapto analogs of cinnamate epoxides. This work looks to extend the substrate scope of the biocatalyst to produce more biologically important and medicinally relevant phenylcysteine molecules. We will focus on synthesizing various ring substituted thiiranes, and incubate them with TcPAM and measure their kinetic parameters.

STRUCTURE-BASED INHIBITOR DISCOVERY FOR A KEY CLINICAL TARGET IN ANTIBIOTIC RESISTANCE
Brian Basinski (Grand Valley State University)
Category & Time: Biochemistry and Molecular Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 30
Mentor(s): Rachel Powers (Chemistry)

β-lactams, such as penicillin, are the most effective treatment for bacterial infections. However, due to their misuse and overuse, bacteria developed resistance. Many antibiotic-resistant bacteria express β-lactamase enzymes that destroy β-lactams by hydrolyzing their defining lactam ring. The class D β-lactamase OXA-24 is of concern due to its ability to hydrolyze a wide range of antibiotics, including one of our last resort antibiotics, the carbapenems. Current clinically available inhibitors of β-lactamase enzymes contain the same core β-lactam ring as the antibiotic, which results in resistance developing more rapidly. To overcome β-lactamase mediated resistance, we used a structure-based drug design approach to identify novel molecules capable of inhibiting OXA-24 activity. Previous work in the lab identified JM52 (K_i 94μM) as a novel, non-β-lactam inhibitor of OXA-24 using the program DOCK. Kinetic assays were performed on 19 analogs of JM52 and identified 6 with improved binding affinity for OXA-24. X-ray crystallography was used to determine the 1.8Å resolution structure of OXA-24 in complex with analog JM52H (K_i 52μM). In the complex, the analog is observed to make several important interactions with key residues in the OXA-24 active site. By better understanding the interactions between OXA-24 and novel inhibitors such as JM52, we can begin to address the problem of antibiotic resistance. The JM52 series provides a starting point from which novel inhibitors can be optimized in an effort to design a drug capable of treating resistant bacterial infections through combination therapy.

THE USE OF A PANEL OF MOUSE STRAINS TO IDENTIFY LOCI ASSOCIATED WITH INDUCED GENE EXPRESSION IN UTERUS
Kalin Bayes (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 31
Mentor(s): Elahé Crockett (Medicine), Peter Dornbos (Biochemistry & Molecular Biology), John LaPres (Biochemistry & Molecular Biology)

Introduction: 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is an environmental contaminant formed as an unintentional byproduct of different industrial processes. TCDD exposure is linked to adverse health effects such as metabolic syndrome, cancer, and embryo toxicity. TCDD-induced toxicity is mediated through the aryl hydrocarbon-receptor (AHR), a ligand-activated transcription factor that regulates the expression of a battery of genes. Little is known how these expression changes lead to toxicity. Objective: The goal is to identify loci within the genome that modulate TCDD-induced gene expression and toxicity. Methods: 15 genetically diverse strains of mice were dosed at 0, 1, 10, 50, 100 ng/kg/day concentrations of TCDD. Total mRNA was extracted from the uterus and the quantity and quality were assessed with a Nanodrop spectrophotometer (ND-1000). The expression of 9 genes associated with AHR-mediated signaling was quantified with Nanostring nCounter technology. Results: The expression of these AHR-target genes are expected strain-specific responses. These results will be used to scan the genome for quantitative trait loci (QTL) that can be used to identify genetic modifiers that drive strain-specific expression patterns. It is anticipated that these QTLs will help us understand why certain populations are more susceptible to TCDD-induced toxicity. Conclusion: Identifying modulators of TCDD-induced gene expression will allow us to link these areas of the genome to a mouse strain's susceptibility to TCDD-mediated toxicity and may provide information into which individuals in the human population may be more at risk of TCDD mediated toxicity. Support: K.B is a REPID Scholar, supported by NIH-HL108864 award to E.C.

EXAMINATION AND PREVALENCE OF ANTIBIOTIC-RESISTANT GENES IN CANADIAN GOOSE (BRENTA CANADENSIS) FECAL SAMPLES AND NEARBY SOIL FROM POTTER PARK ZOO IN LANSING, MI
Amber Bedore (Michigan State University), Alyssa Corpus (Michigan State University), Rachel Driesens (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 32
Mentor(s): Poorna Viswanathan (Microbiology & Molecular Genetics)

This study aimed to assess the risk that Canada Geese (Brenta canadensis) pose to human health as a result of pathogenic bacteria in their feces. To achieve this, the prevalence of antibiotic resistant genes within the feces and the contaminated soils were evaluated. Fecal, contaminated soil, and control soil samples were collected from Potter Park Zoo in Lansing, Michigan. Kirby-Bauer tests were used to evaluate antibiotic resistance of Escherichia coli, Aeromonas, Wohlfahrtiimonas chitiniclastica, and Pseudomonas spp. isolated from the samples. Using primers for antibiotic resistance genes, polymerase chain reaction (PCR) was used to identify the presence of antibiotic resistant genes in the isolates. A TOPO vector was used to transform competent E. coli cells with blaTEM and tet(w) genes that had been isolated and amplified through PCR from the E. coli isolate. Quantitative PCR was then used to assess the prevalence of blaTEM and tet(w) genes in gDNA extracted from a fecal sample. All strains demonstrated resistance to at least 5 antibiotics and contained multiple antibiotic resistant genes. Both blaTEM and tet(w) were present in the fecal sample at concerning levels of 0.064% and 0.458%, respectively. Therefore, Canadian Geese do pose a risk to human health.

CROSSTALK BETWEEN TSPO AND THE AHR PATHWAYS REGULATES GENE EXPRESSION AND THE RESPONSE TO OXIDATIVE STRESS IN MURINE MICROGLIAL CELLS
Glorian Berrios-Vazquez (University of Puerto Rico at Humacao)
Category & Time: Biochemistry and Molecular Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 35
Mentor(s): John LaPres (Biochemistry & Molecular Biology)

The 18-kDA Translocator protein (TSPO, also known as the peripheral benzodiazepine receptor) has been associated with many biological functions, including cholesterol transport and steroidogenesis, apoptosis, response to oxidative stress, and immunomodulation. TSPO has been shown to bind several cellular compounds, including cholesterol and heme metabolites. Several of these endogenous TSPO ligands are also linked to the aryl hydrocarbon receptor (AHR). The AHR is a ligand activated transcription factor that also plays a role in several biological processes, including immunomodulation. The AHR mediates most, if not all, of the toxicity associated with planar aromatic hydrocarbons, such as 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). The aim of this study is to assess the crosstalk between the TSPO and the AHR at the level of gene expression and response to oxidative stress using BV2 murine microglial cell line as a model. Using quantitative reverse transcriptase polymerase chain reaction (QRTPCR), 16 genes that encode for enzymes that metabolize tryptophan were evaluated. In addition, MTT and protein assays were performed in the presence of tellurite to determine if TSPO and the AHR can modulate metal-induced oxidative stress. Our results demonstrate that an exogenous ligand for TSPO, PK11195, and TCDD alter the expression of specific genes within the tryptophan metabolic pathway and modulate tellurite-induced cytotoxicity. The overlap between TSPO and AHR activation suggest that these two signaling pathways overlap and are potential therapeutic targets for neuroinflammation. Currently, we are in process of creating AHR and TSPO null BV2 cell strains using CRISPR-Cas9 to directly test the signaling overlap.

OPTIMIZATION FOR FATTY ACID METABOLITE PURIFICATION AND ANALYSIS
Laura Blaser (Iowa State University)
Category & Time: Biochemistry and Molecular Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 36
Mentor(s): Sing Lee (Pharmacology & Toxicology)

Some omega three fatty acids are known to have health benefits, and some omega six fatty acids, while far more popular in our diet, are known to have negative health effects. While these things are accepted, the precise mechanism of how these fatty acids do what they do to help or hinder the body is not known. The research interest of Dr. Sing Lee is to study specific metabolites of fatty acids to elucidate what role, if any, they play in biological function. The scope of this project will be to synthesize epoxides of several fatty acids using established methods, and to optimize the separation of their regioisomers using flash chromatography. A photoaffinity label will also be synthesized for later use in the project involving biological components. These compounds will be identified and analyzed for purity by using Gas Chromatography-Mass Spectroscopy as well as C-13 and proton Nuclear Magnetic Resonance spectroscopy. The desired outcome of the optimization of these methods will be to enable more efficient research involving the biological function of these metabolites in human health.

MECHANISM OF ACTION STUDIES OF NOVEL INHIBITORS OF THE MYCOBACTERIUM TUBERCULOSIS DOSS AND DOST SENSOR KINASES
Ryan Borchert (Northeastern Illinois University)
Category & Time: Biochemistry and Molecular Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 37
Mentor(s): Robert Abramovitch (Microbiology & Molecular Genetics), Huiqing Zheng (Microbiology & Molecular Genetics)

Mycobacterium tuberculosis (Mtb) is one of the greatest infectious agent killers worldwide, with a growing rate of multi-drug and extensively drug resistant strains in populations across the world. Current treatment of Mtb involves four drugs that are taken over the course of six months, thus demonstrating a need for new and faster-acting drugs. High-throughput drug screening has revealed that the drug, artemisinin, can interrupt the DosRST pathway within Mtb by targeting two heme-based histidine sensor kinases, DosS and DosT. These sensor kinases play critical roles in sensing environmental cues from the host immune system and promoting non-replicating persisting Mtb. The ability of artemisinin to target heme and inhibit DosS and DosT is dependent on an endoperoxide group carried by the drug. Several other synthetic endoperoxides have since been discovered. This study attempts to identify if these compounds can target the heme group located in DosS and DosT, as well as determine their mechanism of action. Our study predicts that these novel endoperoxide compounds can target DosST heme. Moreover, we hypothesize that these compounds can gain access to the Mtb cytoplasm and cause an ROS burst and cellular death. DosS and DosT will be expressed and purified, and the redox-state of their heme will be examined in response to the compounds using UV-visible spectroscopy. To identify their effectiveness and mechanism of action, endoperoxide treated cultures will be examined for cell death, CellRox Green will be utilized to determine ROS bursts, and EC50 curves will be generated to determine their potency.

ROLE OF MINERALOCORTICOID RECEPTOR SIGNALING IN THE DEVELOPMENT OF VASCULAR DEMENTIA DURING HYPERTENSION
Daniel Bota (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 38
Mentor(s): Janice Diaz-Otero (Pharmacology & Toxicology), Anne Dorrance (Pharmacology & Toxicology)

Hypertension causes cerebral artery remodeling and impaired vasodilation. These changes can increase the risk of developing vascular dementia, impacting almost 200,000 people a year in the U.S. Mineralocorticoid receptor (MR) activation causes impaired cerebral artery dilation and remodeling. We hypothesized that MR antagonism will prevent cognitive dysfunction caused by hypertension. 16 week old male C57bl/6 mice were treated with Angiotensin II (AngII) (800ng/kg/min) for 4 weeks ± the MR antagonist, eplerenone (AngII+E). AngII increased systolic blood pressure, an effect not blunted by eplerenone. We analyzed the mRNA expression of several markers of vascular cognitive dysfunction. As expected AngII-induced hypertension reduced the mRNA expression of brain-derived neurotrophic factor (BDNF), doublecortin, glial fibrillary acidic protein (GFAP), and synaptophysin; the reduction in BDNF mRNA expression was prevented by eplerenone treatment. This data suggests that hypertension reduces mRNA expression in the brain for neuronal support, migration, and synapse proteins, as well as neurogenesis. Contrary to what we expected, the mRNA expression of the markers of inflammation IL-6 and TNFα were decreased in the hypertensive mice, while the monocyte chemoattractant protein 1 (MCP1) remained unchanged. mRNA expression for the adhesion molecule, ICAM-1, was also decreased in hypertensive mice. AngII-induced hypertension did not significantly change the mRNA expression of Nox2. We expect that the hypertensive mice will have decreased cognitive and motor function compared to the control mice; this will be prevented by MR antagonism. My findings could potentially help future patients with hypertension and slow degenerative cognitive impairment.

A GENETIC AND ENVIRONMENTAL INTERACTION MODEL OF ALS: THE EFFECTS OF RILUZOLE AND A MOTORIC CHALLENGE
Brooke Brauer (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 39
Mentor(s): William Atchison (Pharmacology & Toxicology), Jordan Bailey (Pharmacology & Toxicology)

Amyotrophic Lateral Sclerosis (ALS), is a neurodegenerative disease that affects the central nervous system. Mice that express the hSOD1 gene mutation ($SOD1^{G93A}$) are used to model ALS since they reliably exhibit an ALS-like phenotype as they age. Previous work has shown that Methylmercury (MeHg), an environmental neurotoxicant, can hasten the onset of the ALS-like phenotype in these mice. The purpose of this study was to understand a gene x environment interaction with MeHg and the $SOD1^{G93A}$ mice by using Riluzole, one of the only FDA-approved pharmaceutical therapies for ALS, and a challenging motoric function assay. Here, we describe the effects on intracellular calcium in motor neurons from the spinal cord of $SOD1^{G93A}$, $SOD1^{HuWT}$ and wild type mice of both sexes following MeHg exposure (20uM). A Riluzole pretreatment commenced before concomitant MeHg + Riluzole treatment. Whole organism disease progression in these three genotypes was also analyzed (via a Digigait® automated treadmill) under a challenging, forced run (incline of 17°) condition. $SOD1^{G93A}$ mice exhibited gait abnormalities before overt signs of the ALS-like phenotype emerged. Initial results suggest that the administration of Riluzole + MeHg, results in a decrease in overall calcium fluorescence, among $SOD1^{G93A}$ animals compared to MeHg-alone and compared to $SOD1^{HuWT}$ and wild type animals. This study will enhance the characterization of the phenotype in this model of ALS, and provide understanding of a gene x environment interaction.

COMPARISON OF PRETREATMENTS OF LIGNOCELLULOSIC BIOMASS FOR MICROBIAL LIPID PRODUCTION
Libby Breton (Siena Heights University)
Category & Time: Biochemistry and Molecular Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 40
Mentor(s): Cynthia Collings (Plant Biology), Shi-You Ding (Plant Biology), Wei Shen (Plant Biology)

Recalcitrance of lignocellulosic biomass is one of the biggest setbacks to efficient biofuel production. Lignin is a complex macromolecule that intertwines in the cell wall and blocks enzymes from breaking down cellulose into fermentable sugars. To overcome this we apply pretreatments to help break down the lignin and give the necessary enzymes access to the cell wall. Therefore, in this study we will compare the pretreatments of dilute sulfuric acid (DA), extractive alkaline (EA), and ammonia fiber expansion (AFEX) on corn stover and how they affect hydrolysis and microbial fermentation by yeast into lipids for biodiesel production. In past studies, AFEX has been known to produce fewer byproducts during hydrolysis that inhibit microbial yeast which should result in a higher lipid yield than the other pretreatments. Two oleaginous yeast species, Rhodotorula glutinis and Yarrowia lipolytica, will be grown on all three pretreatment hydrolysates. Lipid production by the yeasts will be examined and quantified using stimulated Raman scattering microscopy (SRS). This study will not only analyze the effects pretreatment has on biomass hydrolysates, but also the effect on lipid yield. Observing the full process of pretreatment, hydrolysis, and fermentation will allow for a better understanding of the impacts certain components have on lipid yield and how to change those aspects in the future for better results. We anticipate the findings of this experiment will lead to further exploration of yeast pretreatment preferences and will contribute to creating an industrial scale production of biodiesel.

GENETIC ANALYSIS OF THE MECHANISMS THAT SUPPORT STAPHYLOCOCCUS AUREUS GROWTH ON TELLURITE
Ben Brown (Michigan State University) Alexa Calas
Category & Time: Biochemistry and Molecular Biology, Section 3, 1:00 PM - 2:15 PM
Poster: 43
Mentor(s): Phillip Delekta (Microbiology & Molecular Genetics), Neal Hammer (Microbiology & Molecular Genetics)

Diseases caused by Staphylococcus aureus range from skin and soft tissue infections (SSTI) to invasive sepsis or endocarditis. A virulence trait associated with the capacity to cause invasive infections is the ability to clot vertebrate blood. This trait, known as coagulase activity, distinguishes S. aureus from other staphylococcal species and enhances pathogenicity. Coagulase negative strains are associated with SSTI but rarely colonize internal organs. However, additional metabolic traits are also used to distinguish S. aureus from coagulase negative species. For example, S. aureus reduces tellurite, a phenotype that is exploited to selectively isolate coagulase positive strains from contaminated food. It is likely that these metabolic traits also contribute to the increased virulence of S. aureus, but the mechanism of tellurite reduction is unknown. We sought to define the mechanism of tellurite reduction by identifying mutants of S. aureus that are sensitive to tellurite. In other bacterial species tellurite induces oxidative stress and S. aureus encodes multiple oxidative stress pathways that are absent in coagulase negative strains. The production of the golden pigment, staphyloxanthin, is one such example. These facts support the hypothesis that S. aureus is more resistant to tellurite-induced oxidative stress than coagulase negative S. epidermidis. To test this hypothesis, oxidative stress pathways will be inactivated genetically and tellurite sensitivity assessed. The results from these studies have the potential to improve treatment strategies for S. aureus infections by impairing the ability of this pathogen to combat oxidative stress.

ASAT EVOLUTION IN THE SOLANACEAE FAMILY
Tara Caso (Humboldt State University)
Category & Time: Biochemistry and Molecular Biology, Section 3, 1:00 PM - 2:15 PM
Poster: 44
Mentor(s): Rob Last (Plant Biology), Bryan Leong (Plant Biology)

Acylsugars are a group of specialized metabolites produced in plants in the Solanaceae family that mediate plant-insect interactions. They are comprised of a sucrose or glucose molecule conjugated to multiple acyl chains. These compounds are synthesized by acylsugar acyltransferases (ASATs) that fall into a broader class of enzymes, BAHD acyltransferases. In previous studies, we have identified orthologous enzymes that catalyze different steps in the biosynthetic pathway in certain species. We intend to characterize when a shift in the enzymatic activity occurred in the phylogeny of those orthologs from catalyzing the second step in the acylsugar pathway (in Salpiglossis sinuata, a basal Solanaceous species) to the first step (in Solanum lycopersicum, the cultivated tomato - SlASAT1). The project involves amplifying the ASATs of several species present between S. lycopersicum and S. sinuata phylogenetically via PCR, sequencing the genes, and expressing these proteins in E. coli. The enzymes will be purified and tested for both ASAT1 and ASAT2 activities to pinpoint the location in the lineage when the change in activity occurred. This endeavor is a result of the rising interest in the study of non-model organisms, and in particular, the study of plant specialized metabolites. Understanding the evolution of this complex pathway can provide insight into enzyme and pathway evolution. Investigation of specialized metabolites holds great value for the human race; these plant-derived products have been the source of a vast number of cosmetics, culinary additives, and medicines throughout history.

ENHANCEMENT OF THE NANNOCHLOROPSIS TRANSGENIC TOOLKIT
Evan Clarke (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 3, 1:00 PM - 2:15 PM
Poster: 45
Mentor(s): Eric Poliner (Plant Research Laboratory)

Algae can produce substantial biomass with simple environment inputs, and have the ability to produce a variety of bioproducts, including omega-3 fatty acids, carotenoids, and unusual polysaccharides. Specifically, Nannochloropsis is an ideal model for research due to a short reproduction time and high productivity, sequenced genomes of several species, and capacity for genetic engineering. Gene stacking, or the introduction of multiple transgenes, is required for multifaceted genetic engineering, however tools to do this in algae have only recently been developed. In the recently produced pNOC-stacked vectors, multiple genes can be expressed simultaneously through the use of a bidirectional promoter and P2A peptides. My project is to create a high-capacity multi-gene expression system for co-expression of up to five transgenes, in the pNOC-superstacked vectors. To combine multiple stacking cassettes, gateway vectors were generated. This strategy was chosen so a destination vector with a Nannochloropsis resistance gene and an entry vector for epitope tagged transgene expression could be efficiently recombined into a single vector. To test bidirectional promoters for different expression characteristics, we developed a dual-luciferase system. In our dual-luciferase system, Nannochloropsis codon optimized Firefly luciferase and Nanoluciferase reporter genes are placed on either side of the bidirectional promoters and due to different substrates can be measured independently in the same cell lines. For combinatorial use of multiple transgenic tools, we are developing additional resistance markers. With the use of PCR tests, immunoblotting, transformation efficiency, and luminescence measurements, we are characterizing tools for gene stacking in Nannochloropsis.

EFFECTS OF ACUTE MEHG-INDUCED CALCIUM CHANGES IN THE RENSHAW REGION OF THE C57BL6J MOUSE
Yolimar Colon Lopez (Pontifical Catholic University of Puerto Rico in Ponce)
Category & Time: Biochemistry and Molecular Biology, Section 3, 1:00 PM - 2:15 PM
Poster: 46
Mentor(s): William D Atchison (Pharmacology & Toxicology), Monica Rios-Cabanillas (Pharmacology & Toxicology)

Methylmercury (MeHg) is an environmental neurotoxicant that affects the central nervous system (CNS). Previous studies have demonstrated that MeHg targets lumbar spinal cord motor neurons. In many cell types, MeHg neurotoxicity is concomitant with dysregulation of intracellular calcium (Ca2+) homeostasis. Spinal cord alpha motor neurons (αMN) send excitatory signaling onto Renshaw interneurons, which in turn further send inhibitory neurotransmission back to the same αMNs, ultimately modulating αMNs excitation. The effects of MeHg during this recurrent inhibition have never been studied. The aim of this project is to determine the effects of acute MeHg-mediated Ca2+ dysregulation in the excitatory and inhibitory signaling during recurrent inhibition between motor and renshaw cells. Adult lumbar sections of the spinal cord of C57BL6J mice were exposed to 20μM MeHg during 15 minutes. Changes in Ca2+ concentration were recorded at 0, 5, 10 and 15 minutes with Fluo4 during MeHg exposure. The role of the acetylcholine (ACh), glycine and GABAA receptors in the motor and renshaw cells was determined using a pharmacology approach. ACh receptor antagonists: Mecamylamine (MEC), Dihydro-ßerythroidine hydrobromide (DHBE) and glycine and GABAA receptors antagonists: Strychnine and Bicuculline (BCC) were used in the absence and presence of MeHg. It is hypothesized that MeHg toxicity produces a differential disruption of Ca2+ homeostasis in both cells types that mediate recurrent inhibition. Determining the role of MeHg-induced disruption in Ca2+ homeostasis through these receptors could further elucidate the mechanisms of MeHg neurotoxicity in lumbar spinal cord recurrent inhibition.

REDUCTION OF HYPEROXIA-INDUCED A549 LUNG EPITHELIAL CELL CASPASE-9 ACTIVATION AND APOPTOSIS WITH THE MAS AGONIST AVE-0991
Malcolm Davis (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 3, 1:00 PM - 2:15 PM
Poster: 48
Mentor(s): Elahé Crockett (Medicine), Bruce Uhal (Physiology), Amal Abdul-Hafez (Physiology)

Background: Fibrotic pulmonary diseases such as bronchopulmonary dysplasia have been found to develop in premature neonates that are exposed to hyperoxic gas. Research has also found that cells exposed to hyperoxia undergo apoptosis. The Ang (1-7)/Mas Axis has been found to hinder apoptosis and AVE 0991 is a masagonist that performs actions identical to that of ang 1-7. The purpose of this experiment is to determine whether AVE 0991, can be used to hinder apoptosis in cells exposed to hyperoxic gas. Hypothesis: It is hypothesized that hyperoxic conditions will activate caspase-9 and result in apoptosis. Treating the hyperoxic cells with AVE 0991 will significantly decrease the number of cells undergoing hyperoxia-induced apoptosis. Methods: To test this hypothesis, two groups of A549 lung epithelial cells will be placed in separate incubators, each for 24 hours. One group will incubate in 95% Oxygen and the other group in 22% oxygen. Western Blots will be performed to measure Caspase-9 activation in both normoxic and hyperoxic cells and an apoptosis assay (nuclear fragmentation) will be performed. Results: Data for this experiment are currently being generated and will be presented at Mid-SURE. Conclusion: If the data generated supports the stated hypothesis, a deeper understanding of the relationship between the effect of hyperoxic exposure to the lungs, and the renin angiotensin system can be obtained leading to further insights to be made. Support: M.D is a REPID Scholar supported by the NIH 5-R25HL108864 Award to Elahé Crockett, REPID Program Director.

CRYO-ELECTRON MICROSCOPY OF MSU BACTERIOPHAGES
William Dean (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 4, 1:00 PM - 2:15 PM
Poster: 51
Mentor(s): Kristin Parent (Biochemistry & Molecular Biology)

Bacteriophages, viruses that infect bacteria, are among the most abundant entities in the biosphere. Despite their inability to infect humans, these “phages” have the potential to play a significant role in human health. As bacterial antibiotic resistance increases, especially throughout the developing world, new strategies need to be developed to address this problem. Recently, phage therapy has been considered as a possible alternative approach. To accomplish this goal, in-depth information is needed concerning the interactions between phages and their hosts. Therefore, it is vital to have structural information on the phage, both as a way of initial characterization and also to help shed light on the interactions between the virus and its host. In this study, several bacteriophages infecting enteric bacteria were isolated from Michigan State’s campus and seven of these were chosen for characterization using cryo-electron microscopy, based on their rare genome sizes. Low resolution (~15-20 Å) 3D electron density maps were reconstructed for each phage. All seven displayed an unusual type of capsid symmetry. Additionally, the maps indicate the presence of structures, which are likely decorator proteins, equally spaced around each 5-fold vertex of the viral capsid. Interestingly, in 3D reconstructions performed using only empty virus particles, the decorator protein is missing, suggesting that genome ejection is somehow facilitating the release of these proteins from the capsid. Future studies will aim to uncover the true, high-resolution structure of these decorator proteins and to understand what role they play, if any, in the life-cycle of the phage.

CHARACTERIZATION OF A BACTERIAL MICROCOMPARTMENT SHELL PROTEIN PREDICTED TO BIND FES CLUSTER
Cassie Dutcher (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 4, 1:00 PM - 2:15 PM
Poster: 52
Mentor(s): Bryan Ferlez (Biochemistry & Molecular Biology), Cheryl Kerfeld (Biochemistry & Molecular Biology)

Bacterial microcompartments (BMCs) are proteinaceous organelles containing an enzymatic core that defines their function. BMCs are predicted to be found in 23 bacterial phyla, and their enzymatic core is known to have many variations, reflecting their functional diversity. Despite this, only three different proteins are required to construct the shell: a single BMC domain (Pfam00936) protein BMC-H which forms cyclic hexamers, a BMC-T protein which contains two BMC domains and forms pseudohexamers, and BMC-P which contains a single Pfam03319 domain and forms pentamers. Interestingly, some BMC-H proteins contain an extra 100-200 amino acids at the C-terminus of their Pfam00936 domain. Little is known about this extra domain beyond the identification of a conserved four-cysteine motif (CX2CX4CX10C, where X is an amino acid other than cysteine) that may bind an iron-sulfur (FeS) cluster. FeS clusters are known to be chemically versatile both structurally and functionally, serving as cofactors in wide range of biochemical reactions, including electron transfer reactions. Our lab is interested in determining what kind of FeS cluster, if any, is bound by these BMC-H proteins. Here, I describe the heterologous expression, purification and initial characterization of a BMC-H protein with an extended C-terminal domain containing a proposed FeS cluster binding site. Understanding the function of this domain will not only broaden our understanding of native BMCs, but will also expand our capacity to design and engineer synthetic BMC nanoreactors with novel functions.

UNDERSTANDING THE MECHANISMS UNDERLYING DIFFERENCES IN SWIMMING OF PANDEMIC VIBRIO CHOLERAE
Benedict Ivan Franco (Rockhurst University)
Category & Time: Biochemistry and Molecular Biology, Section 4, 1:00 PM - 2:15 PM
Poster: 53
Mentor(s): Yann Dufour (Microbiology & Molecular Genetics), Christopher Waters (Microbiology & Molecular Genetics)

Vibrio cholerae is the polar-flagellated gram-negative bacterium responsible for the diarrheal disease cholera, which infects millions of people a year resulting in hundreds of thousands of deaths. Understanding how V. cholerae persists in the environment and causes disease is important to combat this global pandemic. There are two biotypes of Vibrio cholerae capable of causing pandemic cholera: classical and El Tor. The first six known pandemics of cholera were caused by the classical biotype, while the 7th, and current pandemic that emerged in 1961, is almost exclusively the result of El Tor infections. We have recently discovered that El Tor has a lower degree of bacterial motility (i.e. swimming) than its classical counterpart. Regulation of chemotaxis and motility are extremely important events during host intestinal colonization as V. cholerae must readily alternate from a sessile biofilm state to its motile form to release cholera toxin into epithelial cells. To understand the molecular mechanisms responsible for the reduction in El Tor motility, we are screening a single copy El Tor cosmid library in classical strain O395 for mutants that exhibit reduced swimming through low-density agar. Once these mutants are isolated, we will sequence the random El Tor genomic fragments that they harbor to identify the genes responsible for this phenotype and use single-cell analysis to characterize and quantify their motility. This investigation will help in explaining El Tor's pathogenicity, its relatively recent global emergence of El Tor, and aid in further understanding how it differs from the classical biotype.

BIOSENSING WATER CONTAMINANTS WITH GENETICALLY ENGINEERED SHEWANELLA ONEIDENSIS MR-1
Ciara Fromwiller (Michigan State University), Brian Amburn (Michigan State University), Noelia Barvo (Michigan State University), Donna Liebelt (Michigan State University), Cody Madsen (Michigan State University), Serenity Tyll (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 4, 1:00 PM - 2:15 PM
Poster: 54
Mentor(s): Danny Ducat (Biochemistry & Molecular Biology), Bjoern Hamberger (Biochemistry & Molecular Biology), Michaela TerAvest (Biochemistry & Molecular Biology), Tim Whitehead (Engineering)

As one of the most important natural resources, the declining quality of fresh water is a world-wide issue. Pollutants such as pharmaceuticals, hormones and heavy metals are rarely monitored and the need to detect and remove these compounds in an inexpensive way is what motivates this project. The marine bacterium Shewanella oneidensis MR-1 could be a part of the solution through its unique ability to interact with electronics. The Mtr pathway in S. oneidensis MR-1 is an external electron transportation pathway that is able to transfer electrons to an external acceptor such as an anode, thus generating electric current that is utilized in bioelectrochemical systems. We are utilizing S. oneidensis MR-1 ΔMtrB, the MtrB gene is removed, to prevent electron flow to an outside source through this key protein. We are then inserting a plasmid into this strain that contains the MtrB gene under control of a promoter that activates transcription of the protein when induced by compounds such as pesticides and metals in the water. This will allow for controlled electrical expression that can be used in microbial fuel cells to create a biosensor for the detection of these compounds. This biosensor will then be engineered to be manufactured on a large scale to be used for research, education, humanitarian efforts and even consumer use. Although the proof of concept is currently tested in a single chambered bioelectrochemical system, an affordable and portable paper microbial fuel cell system is currently in development.

DITERPENOID BIOSYNTHESIS OF THE MINT FAMILY
Alekzander Garcia (Tennessee State University)
Category & Time: Biochemistry and Molecular Biology, Section 4, 1:00 PM - 2:15 PM
Poster: 55
Mentor(s): Bjoern Hamberger (Biochemistry & Molecular Biology), Sean Johnson (Biochemistry & Molecular Biology)

Diterpenoids are a class of compounds that have been recognized for their powerful pharmacological activities; e.g. antiproliferation and cytotoxicity of cancer cell-lines. The problem is that there is a lack of knowledge about diterpenoid biosynthesis in the mint family (Lamiaceae). We examined the unusual diterpenoid profiles of selected species with the goal of identifying the tissues where diterpenoids accumulate, and suggesting their possible biosynthetic routes and involved intermediates. We selected the following plants for containing possible novel compounds: Perovskia atriplicifolia, Salvia officinalis, and Prunella vulgaris. In these plants, diterpenoids have been identified, but the diterpenoid biosynthesis and the tissues where diterpenoids accumulate are unknown. We identified the tissue (root, leaf, stem, and trichome) where novel diterpenoids accumulated in higher abundance. We accomplished this by extracting the diterpenoids from the plant tissues and analyzing them on liquid chromatography-mass spectrometry (LC-MS) and gas chromatography-mass spectrometry (GC-MS) and identifying the diterpenoids by their predicted exact mass. We identified an intermediate compound that was highly abundant in the trichomes of Perovskia atriplicifolia, and the roots of Salvia officinalis by analyzing its exact mass, which we predicted would be unique to both plants. Prunella vulgaris contained a predicted intermediate with extremely high abundance in the roots that was also identified. The detection of the proposed intermediates supports the suggested biosynthetic routes. The tissue specific localization of the diterpenes will direct transcriptome analysis to discover the genes that encode the enzymes of the biosynthetic pathways. Knowledge of the pathways will allow future engineering of biotechnological production.

EFFICACY OF BIOCIDE AND ANTIBACTERIAL TREATMENT ON BACTERIAL BIOFILMS FROM MSU WATER COOLING TOWERS
Charnay Gloss (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 4, 1:00 PM - 2:15 PM
Poster: 56
Mentor(s): Chris Waters (Microbiology & Molecular Genetics)

Water cooling towers at MSU utilize water energy to decrease the amount of electricity the campus uses. These water systems promote bacterial growth that cause corrosion of the water plant. This bacterial growth produces biofilm, which are multicellular communities of bacteria in an extracellular matrix attached to a surface. To prevent corrosion, biocides are added to the water to reduce bacterial growth. As biofilms have numerous mechanisms to resist toxic chemicals, it is not clear if these biocides are effective at killing biofilm communities of these bacteria. The goal is to test the efficacy of the biocides and known antibacterials on planktonic, or free-living, and biofilm growth to provide better treatment of these water systems. Another goal is to assess what bacteria live in these water systems. Three populations of bacteria were collected from two different water plants on campus, and the populations of bacteria were grown planktonically and in biofilms. The efficacy of five common biocides used at MSU was assessed and compared with antibacterials tobramycin and triclosan. Variable killing capacity is shown throughout all populations of bacteria in preliminary planktonic killing trials. The results of my research indicates that the biocide “SM116” is the least effective across all bacterial populations. My results suggest that planktonic growth is more sensitive biocide treatments than biofilm growth. The bacterial members of these communities are being assessed. The results of my experiments will be used to develop novel biocides to inhibit or eradicate problematic bacterial biofilms in water cooling systems.

MONITORING N2O PRODUCTION USING A CNOR MODELED ACTIVE SITE
Zabrenna Griffiths (Florida Agricultural and Mechanical University)
Category & Time: Biochemistry and Molecular Biology, Section 5, 1:00 PM - 2:15 PM
Poster: 60
Mentor(s): Clarisse Finders (Biochemistry & Molecular Biology), Joshua Haslun (Biochemistry & Molecular Biology), Eric Hegg (Biochemistry & Molecular Biology)

Nitrous oxide (N_2O) is a potent greenhouse gas with a 100-year global warming potential (GWP) 265-296 times greater than carbon dioxide (CO_2). It is the leading contributor to ozone depletion and can persist in the stratosphere for approximately 114 years. Therefore, understanding the sources of atmospheric N_2O emissions is critical to remediating the effects of climate change. Agricultural activities are the largest contributor to N_2O emissions in the U.S. with microbial nitrification and denitrification as the dominating soil processes. Enzymes are biological catalysts that have a role in these biotic processes. The enzyme responsible for bacterial denitrification is cytochrome *c* nitric oxide reductase (cNOR). It is often difficult to study the enzymes involved in biotic N_2O production, hence, model enzymes are a useful tool. The enzyme I107EFe_BMb, a sperm whale myoglobin derivative, models the active site of cNOR and can be used to simulate the anaerobic reduction of NO to N_2O by cNOR. Dithionite induces the catalytic activity of I107EFe_BMb by reducing the enzyme. However, because dithionite is a strong reductant, it is capable of reducing NO to N_2O directly. Therefore, the dithionite-enzyme mixture is passed through a size-exclusion column to isolate the reduced enzyme. This reduced and purified enzyme is then utilized to investigate N_2O production from NO. This project will provide both an enzymatic and abiotic model to study N_2O production.

MIRNA-34B/C AS DISEASE PROGRESSION BIOMARKERS FOR PARKINSON'S DISEASE
Ashleigh Harrah (Grand Valley State University), Macie Weiland (Grand Valley State University)
Category & Time: Biochemistry and Molecular Biology, Section 5, 1:00 PM - 2:15 PM
Poster: 61
Mentor(s): Sok Kean Khoo (Cell & Molecular Biology)

Parkinson's disease (PD) is a neurodegenerative disorder that causes impaired motor control, tremors, muscle rigidness, and bradykinesia, in individuals over the age of 60. Patients with PD are found to have decreased levels of dopamine in the mid-brain. Aggregation of the alpha-synuclein protein is observed in dopamine-producing neurons. Although the cause of PD is still unknown, over-expression or high levels of alpha-synuclein correlates with decreased function of these neurons, suggesting alpha-synuclein accumulation may lead to PD. MicroRNAs (miRNAs) are small RNA molecules that regulate gene expression by complementary binding to the messenger RNA (mRNA) transcript of a target gene, and inhibiting or decreasing subsequent protein production. In PD, expression of miRNA-34b and 34c are found to be significantly lower in brain tissues of PD patients and cell lines, compared with healthy controls. MiRNA-34b/c have complementary binding sites to alpha-synuclein mRNA, and down-regulation of miRNA-34b/c has been shown to increase protein expression of alpha-synuclein. Since there is no cure for PD, accurate monitoring of disease progression is needed to gauge old or new drug efficacy. Here, we evaluate the expression of miRNA-34b/c in fast and slow progression patients with PD at the time of initial diagnosis (baseline) and 12-18 months after diagnosis. MiRNA-34b/c could serve as clinically relevant biomarkers to monitor disease progression and measure drug efficiency.

THE ROLE OF DLK1 FROM OX-DLK1 NEURONS IN REGULATING PHYSIOLOGY
Tatiyana Harris (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 5, 1:00 PM - 2:15 PM
Poster: 62
Mentor(s): Elahé Crockett (Medicine), Raluca Bugescu (Physiology), Gina Leinninger (Physiology)

Background: Orexin (OX) neurons within the lateral hypothalamic area (LHA) regulate body weight, alertness, reward and anxiety. It has been suggested that subpopulations of OX neurons perform distinct roles, yet distinguishing them remained unclear. Recently, the Leinninger lab demonstrated that approximately half of all mouse OX neurons contain the transmembrane protein delta-like 1 homolog (DLK1), making DLK1 uniquely poised to identify a subpopulation of OX neurons that we term "OX^{-DLK1} neurons". Hypothesis: We hypothesize that these OX^{-DLK1} neurons mediate specific physiological aspects and that DLK1 is essential for their function. Method: Mice deleted of DLK1 from OX^{-DLK1} neurons. Adult $DLK1^{flox/flox}$ mice were injected in the LHA with either AAV-GFP (Control) or AAV-Cre-GFP thus inducing Cre-mediated deletion of DLK1 selectively from the OX^{-DLK1} neurons (DLK1-Null). Studying the feeding, metabolism and body composition of these mice will enable us to determine if the DLK1 from OX^{-DLK1} neurons is required for regulating body weight. Additionally, we are testing the mice via sucrose preference and amphetamine-induced locomotor activity to determine if OX^{-DLK1} neurons mediate reward behaviors. Finally, we are examining these mice via elevated plus maze and open field testing, which will indicate whether DLK1 signaling via OX^{-DLK1} neurons mediates anxiety. Conclusion: The data will reveal how the novel subpopulation of OX^{-DLK1} neurons contributes to physiology, and may suggest if modulating these neurons could be useful to treat body weight or anxiety disorders. Support: T.H. is a REPID-Scholar: NIH-5-R25-HI108864 to E.C.

AVE 0991 INHIBITS MECONIUM-INDUCED APOPTOSIS IN HUMAN LUNG EPITHELIAL CELLS
Romel Holmes (Tuskegee University)
Category & Time: Biochemistry and Molecular Biology, Section 5, 1:00 PM - 2:15 PM
Poster: 63
Mentor(s): Bruce Uhal (Biomedical & Physical Sciences)

Meconium Aspiration Syndrome is a fetal respiratory condition caused by the inhalation of meconium before or during delivery. Although meconium is inherently sterile, pneumonitis, hypoxia, and possible scarring of the lungs may occur due to its apoptotic-inducing effects in alveolar epithelial cells. However, studies have shown that the inhibitors of the angiotensin pathway inhibit the apoptotic response of lung epithelial cells to other toxins. Prior research has shown that ANG1-7 (angiotensin 1-7, the product of the protective enzyme ACE-2) inhibits phosphorylation of the c-Jun N-terminal kinase (JNK) through activation of the mas receptor, thus inhibiting apoptosis. We hypothesize that using the synthetic mas receptor agonist, AVE 0991 will inhibit meconium induced apoptosis. A549 cells, a line of human adenocarcinomic alveolar epithelial cells, will be cultured to 50% confluence. The media will be aspirated and replaced with serum-free F-12 media containing 1% penicillin streptomycin (pen-strep) antibiotic for 20 hours. The media was aspirated and selected wells (2 columns) will be treated with 2.5% meconium and serum-free (+1% pen-strep) F-12 media. Selected cells also receive a treatment of 1 x 10-7 M of AVE 0991. After another 20-hour incubation period, cells will be fixed with 70% ethanol. Fluorescent microscopy using propidium iodide will be used to determine apoptotic cells based on altered nuclear morphology. A GraphPad Instat t-test and Student Newman Keuls post hoc test will be used for analysis.

IDENTIFICATION OF KINASE/S THAT PHOSPHORYLATES SERUM- AND GLUCOCORTICOID- INDUCIBLE KINASE 1 (SGK1) AT A SITE REGULATED BY DRUGS OF ABUSE
Briana Huisken (Kalamazoo College)
Category & Time: Biochemistry and Molecular Biology, Section 5, 1:00 PM - 2:15 PM
Poster: 64
Mentor(s): Vedrana Bali (Physiology), Michelle Mazei-Robison (Physiology)

Drug addiction is a serious health issue with limited and inadequate treatment options. Although dysregulation of the brain reward circuit has been implicated in addiction, our understanding of signaling changes within this circuit is incomplete. Previous work from our lab demonstrated that chronic administration of cocaine and morphine increases phosphorylation and activity of serum and glucocorticoid-inducible kinase 1 (SGK1) in the ventral tegmental area of mice. However, the kinase/s responsible for phosphorylation of serine 78 (S78) in SGK1 are currently unknown. Therefore we used an in silico approach and identified four candidate kinases potentially capable of phosphorylating SGK1 S78: glycogen synthase kinase 3 beta (GSK3β), extracellular-signal regulated kinase 5 (ERK5), ERK 1/2 and cyclin dependent kinase 5 (CDK5). To determine whether these candidate kinases are capable of phosphorylating SGK1 S78, I will test a series of pharmacological inhibitors in Neuro 2A cells, a mouse neuroblastoma cell line. Following serum starvation and insulin treatment to increase S78 phosphorylation, I will incubate cells with specific kinase inhibitors, then lyse the cells and isolate protein for western blot analyses. Importantly, I will use multiple concentrations of inhibitors in order to generate an inhibition curve to identify the inhibitor with the greatest potency for decreasing SGK1 S78 phosphorylation, as this will serve as the lead compound in future in vivo studies. Thus, the overall goal of this project is to identify the kinase/s responsible for the phosphorylation of SGK1 S78, as inhibiting this process could yield a new treatment avenue for drug addiction.

ENGINEERING THE MICROALGA NANNOCHLOROPSIS OCEANICA FOR BIOENERGY AND BIOFUEL
Brennan Hyden (Washington State University)
Category & Time: Biochemistry and Molecular Biology, Section 5, 1:00 PM - 2:15 PM
Poster: 65
Mentor(s): Christoph Benning (Biochemistry & Molecular Biology), Zhiyan Du (Biochemistry & Molecular Biology)

The microalga Nannochloropsis oceanica is significant in its potential for biofuel production due to high amounts of triacylglycerol. As a result, there is interest in characterizing TAG formation in this species and developing methods to improve efficiency of production and processing. This research focuses on two primary goals. The first involves a CRISPR/CAS9 mediated knockout of genes associated with lipid development in N. oceanica to characterize their precise role in lipid biosynthesis. The target genes included WSD1 which encodes a wax ester synthase, and three acyl-CoA-binding protein genes ACBP1, ACBP2 and ACBP6. We co-expressed the single guide RNAs and CAS9 with a bidirectional promoter to disrupt the target genes. N. oceanica is able to maintain circular DNAs and the Benning/Farre labs have recently established a system for episomal plasmid expression of CAS9 and sgRNAs, which removes the transgene after the CAS9-mediated mutation has been introduced. Using this technique, we will generate maker and CAS9 free mutants in N. oceanica. The second goal was to harvest N. oceanica by flocculation with the oleaginous fungus Mortierella elongata. We measured chlorophyll and TAG over the course of a week after the cultures reached stationary phase. The prolonged incubation led to TAG accumulation coupled with decrease in chlorophyll, allowing us to use chlorophyll as an indicator for TAG content. The high TAG algal cells were harvested by fungal flocculation and mesh filtration. Analysis revealed that the algal-fungal aggregates produced high amounts of TAG with polyunsaturated fatty acids.

HIGH MOBILITY GROUP B1 ENHANCES ACTIVATION OF MACROPHAGES BY PLASMIN
Justin Ingram (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 6, 1:00 PM - 2:15 PM
Poster: 68
Mentor(s): Bryan Copple (Pharmacology & Toxicology), Elahé Crockett (Medicine), Katherine Roth (Pharmacology & Toxicology)

Introduction: Studies have shown that when hepatocytes in the liver become necrotic they release a damage-associated molecular pattern (DAMP) protein called high mobility group-box 1 (HMGB1). Studies have shown that HMGB1 is critical for hepatic inflammation during liver toxicity. We showed recently, though, that the fibrinolytic enzyme, plasmin, is also essential for macrophage activation after injury, suggesting that HMGB1 and plasmin may interact to promote full activation of macrophages. Whether this occurs, however is not known. Hypothesis: Plasmin and HMGB1 interact to produce full macrophage activation after liver injury. Methods/Results: To test this hypothesis, macrophages were differentiated from mouse bone marrow and treated with plasmin and/or HMGB1. Treatment of macrophages with plasmin increased cytokine production (i.e., activation). In contrast HMGB1 had no effect on macrophage activation. HMGB1 did, however, enhance activation of macrophages by plasmin. To gain some insight into the mechanism by which this occurred, we evaluated activation of various signal transduction pathways. The results demonstrated that plasmin activated p38, an effect that was enhanced by HMGB1. Conclusion: Results from these studies indicate that HMGB1 enhances macrophage activation by plasmin and that this may occur through enhancement of p38 activation. Support: Justin Ingram is a REPID scholar supported by NIH-5-R25-HL108864-award to Elahé Crockett, REPID Program Director, and NIH- DK073566 award to B. Copple.

IDENTIFICATION AND CHARACTERIZATION OF LANTHANIDE-DEPENDENT SYSTEMS IN M*. EXTORQUENS* AM1
Tyrell Jamison (Claflin University)
Category & Time: Biochemistry and Molecular Biology, Section 6, 1:00 PM - 2:15 PM
Poster: 69
Mentor(s): Cecilia Martinez-Gomez (Microbiology & Molecular Genetics)

Lanthanides are metals that are extremely insoluble, and are also known as rare-earth elements (REE). Until recently, they were believed to be inert in biology. However, it was found that methylotrophs were capable of solubilizing and transporting these elements into the cell. Methylotrophs are microorganisms that use one carbon compounds as their carbon source for energy and growth. Using the model organism Methylobacterium *extorquens* AM1, the Martinez-Gomez lab has shown that two methanol dehydrogenases use lanthanides, XoxF and ExaF. My goal is to purify both proteins for further crystallization. Cultures overproducing both enzymes were obtained by growing M. extorquens encoding a plasmid carrying the ExaF or XoxF under a lanthanide inducible promoter. Both proteins were purified using affinity chromatography. Purification greater than 90% was achieved with a final yield of 5 mg/ml and 10 mg/ml with respects to XoxF and ExaF. Further, in order to understand how M. *extorquens* solubilize lanthanides, the optimization of a colorimetric assay to measure lanthanide content is currently being pursued. This will allow for phenotypic characterization of mutants that are predicted to disrupt the solubilization and transport of lanthanide systems present on our bacterial model. Understanding these proteins and the transport mechanism utilized by M. *extorquens* for the solubilization and intake of lanthanides will play a major role in understanding lanthanide biology as a whole.

LANTHANIDE IMPACT TO A FORMATE DEHYDROGENASE DURING METHYLOTROPHY
Jonathan Jamssens (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 6, 1:00 PM - 2:15 PM
Poster: 70
Mentor(s): Cecilia Martinez-Gomez (Microbiology & Molecular Genetics), Nathan Good (Microbiology & Molecular Genetics)

Lanthanides are required for some methylotrophic enzymes to be active, but the evolution of the enzymes were once thought to be implausible because of the low solubility of lanthanides. The transcriptional profile of Methylobacterium extorquens AM1's grown on methanol in the presence of lanthanides has shown upregulation of genes encoding numerous dehydrogenases when compared to a condition where lanthanides are absent. Some targets include alcohol dehydrogenases such as XoxF and ExaF, and a formate dehydrogenase, fdh4, from which very little is known. XoxF and ExaF have been purified and corroborated that carry lanthanides as cofactors and therefore we aim to corroborate if this is the case for fdh4. In this work, we want to see if the transcriptional effect observed correlates with activity. M. extorquens was grown on methanol in the presence and absence of lanthanum. FDH activity will be determined from each condition and compared to detect differences. Briefly, FDH activity can be measured using a NAD dependent assay or using NAD independent assay using the electron carrier dichlorophenolindophenol (DCPIP). Differences in activity will corroborate the transcriptomic results.To further investigate the effect specifically on Fdh4, the same activity will be measured but using mutants of each of the 4 FDHs present in M. extorquens. Finally, FDH4 purification will be pursued using affinity chromatography. The experiments will allow me to conclude that the transcriptional up regulation of FDH4 correlates to the activity of the enzyme in the presence of lanthanum and elucidate if lanthanum is used as a cofactor in this class of enzymes.

KINETIC, MECHANISTIC, AND STEREOCHEMICAL INVESTIGATION OF A NEWLY DISCOVERED AMINOMUTASE FROM TAXUS CANADENSIS
Gyuha Jang (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 6, 1:00 PM - 2:15 PM
Poster: 71
Mentor(s): Kevin Walker (Chemistry), Tyler Walter (Chemistry)

A family of enzymes uses a 4-methylidenimidazol-5-one (MIO) formed autocatalytically within the active site. So far, this MIO-family uses either phenylalanine or tyrosine as its substrate. This family bisects into two subclasses: 1) ammonia lyases (ALs), which convert the substrates into acrylates exclusively, and 2) aminomutases (AMs), which convert the substrates into β-amino acid isomers (major) and acrylates (minor). Most notable of these enzymes is a phenylalanine aminomutase from Taxus canadensis (TcPAM) that lies on the biosynthetic route to paclitaxel (TaxolTM), a widely used chemotherapeutic. TcPAM converts (S)-α- to (3R)-β-phenylalanine (at >99% ee) and trans-cinnamate. Recently, we discovered another Taxus canadensis enzyme, originally classified as a phenylalanine ammonia lyase (TcPAL) based on its amino acid sequence similarity (73% similar; 62% identical) to other ALs. TcPAL surprisingly converted α-phenylalanine to its β-isomer and cinnamate just like TcPAM. This was curious because TcPAL resembles AL sequences more than it does the TcPAM sequence (61% similarity; 43% identical). Therefore, we hypothesize that the β-amino acid product of TcPAL may have a biologically different role than that made by TcPAM. To test this claim, the product stereochemistry and mechanism of the TcPAL reaction was resolved using 2H-labeled α-phenylalanines. We then derivatized the biosynthetic products with a chiral auxiliary, and analyzed them by gas chromatography-mass spectrometry (GC-MS) and nuclear magnetic resonance (NMR). Further comparison of TcPAL with other MIO-dependent enzymes from plants will shed light on these mechanistic curiosities.

THE ROLE OF ENDOPLASMIC IRE-1 ACTIVATION IN LIVER CANCER
Grace Jansen (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 6, 1:00 PM - 2:15 PM
Poster: 72
Mentor(s): Christina Chan (Chemical Engineering), Amrita Oak (Chemical Engineering)

There are a multitude of factors that can induce endoplasmic reticulum (ER) stress. Because of this, the ER activates the unfolded protein response (UPR), which recognizes and rectifies the ER stress. One of the master regulators of the UPR is the IRE-1 alpha protein. The dimerization of this protein is caused by stressors including palmitate, which triggers the UPR, ultimately resulting in either death or adaptation of the cell, the latter resulting in the elimination of the stress and the continued proliferation of the cell. In order to better understand the IRE-1 protein and its influence in managing cell stress, efforts are currently being taken to elucidate the impact of IRE-1 on cell signaling and metabolism. Achieving that objective involves expressing and purifying the IRE-1 protein, generating HEP3B (human liver) cells that do not express IRE-1, and obtaining their metabolic profile. Initially, this will comprise of assays to measure the levels of key metabolites including glucose and lactate. We hypothesize that a better understanding of the IRE-1 protein and its potential role in metabolism during the UPR will help elucidate a mechanism by which fatty acids, such as palmitate, lead to the progression of cancer. Palmitate, a fatty acid, is known to be present at elevated levels in obese individuals, and insight into the signaling cascade and metabolism induced by IRE-1 could lead to novel cancer treatments.

USING A PCR-BASED APPROACH TO INVESTIGATE THE FUNCTION OF CHLOROPLAST HSP90 IN CHLOROPLAST-TO-NUCLEUS SIGNALING
Hannah Jeffery (Alma College)
Category & Time: Biochemistry and Molecular Biology, Section 6, 1:00 PM - 2:15 PM
Poster: 73
Mentor(s): Lynn Richardson (Plant Biology), Danny Schnell (Plant Biology)

Hsp90C (Heat-shock protein of 90 kilodaltons in chloroplasts) belongs to a family of highly-conserved protein chaperones, which are known to assist key processes, including protein folding during the normal protein-folding cycle, intracellular signaling, and protein translocation across membranes. Hsp90 family members are also highly upregulated in response to stresses, particularly heat. Previous studies of Arabidopsis thaliana plants with a mutant version of the chloroplast Hsp90 gene, called cr88, suggested that Hsp90C plays a role in chloroplast-to-nucleus retrograde signaling, and RNA-seq data suggests that this may involve the heme-signaling pathway. In this study, we directly compared the expression of several photosynthesis-associated nuclear genes (PhANGs) in control plants to Hsp90C mutant plants that mimic the cr88 mutant using a PCR-based approach. We extracted RNA from 28-day-old plants, generated cDNA using reverse transcriptase, and measured expression levels using primers designed to target PhANGs, heme-biosynthesis genes, and the retrograde signaling transcription factor, AtGLK1. We performed data analysis using the BioRad ChemiDoc MP system with Image Lab software. Statistical analysis of the candidate genes SSU1A and AtGLK1 provide evidence that these genes are differentially regulated in the cr88 mimic. We anticipate that other candidate genes, such as heme oxygenase 1 (HO1) and elongated hypocotyl 2 (HY2), will also show evidence of differential expression. Overall, the current data supports our hypothesis that Hsp90C plays an important role in chloroplast-to-nucleus signaling.

ARNTL2 PLAYS A METASTATIC THROUGH NON-CIRCADIAN RHYTHM PATHWAYS
Nathan Kauffman (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 7, 2:30 PM - 3:45 PM
Poster: 75
Mentor(s): Sophia Lunt (Biochemistry & Molecular Biology), Shao Thing (Biochemistry & Molecular Biology)

Aryl hydrocarbon receptor nuclear translocator-like 1 and 2 (ARNTL1 and ARNTL2 or BMAL1 and BMAL2, respectively) are genes associated with the circadian rhythm, the repetitive biochemical pathway that keeps our internal processes on a 24 hour clock. This lets our body keep track of time, regardless of external stimuli such as light, allowing for regulation of various downstream pathways such as cell growth and metabolism. Recently, literature has been published pointing towards cancerous side effects from a dysregulated circadian rhythm. Specifically, increased expression of ARNTL2 is associated with increased metastasis- the dissemination of cancer cells from the primary tumor into other organ systems-however, the mechanism for this remains unknown. My research involves knocking out the ARNTL genes in mouse cell lines using gene editing technology and comparing the differences in primary and secondary tumor phenotypes after injection of the cells into mouse models. I will also compare biochemical changes in both cell lines and mice to reveal the ARNTL genes' role in metastasis. This research is important because cancer cells use certain biochemicals differently than non-cancerous cells. Identifying and targeting these differences with drugs could improve the prognosis of cancer patients. In this presentation, I will showcase the methods for the project including use of CRISPR/Cas9 gene editing technology for knocking out these circadian rhythm genes, the fluorescent activated cell sorting method for positive cells, and mass spectrometry for examining differences in energy related molecules (metabolites) and explain experimental results including circadian rhythm correlation, metabolic changes, and cancer.

TRYPANOSOMA BRUCEI UTILIZES DUAL-CODING GENES THROUGH RNA EDITING
Brittany Ladson (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 7, 2:30 PM - 3:45 PM
Poster: 76
Mentor(s): Donna Koslowsky (Microbiology & Molecular Genetics)

Kinetoplastids are responsible for diseases such as Leishmaniasis, Chagas disease, and trypanosomiasis. Trypanosomiasis, more commonly called Sleeping Sickness, is caused by Trypanosomas brucei and produces fevers, headaches, and joint pain then gradually progresses to changes in behavior and sleep cycle disturbances for which the disease is named. If treatment is not provided, the condition is considered fatal which is of tremendous concern for tropical third world countries where the vector is abundant and treatments are scarce. T. brucei is transmitted by the tsetse fly but it spends an extended period of time in a human host. To survive in such diverse conditions, T. brucei utilizes certain genes in the tsetse fly and others in the human environment. Previous research has suggested that T. brucei is maintaining at least six genes as dual-coding genes (CR3, CR4, ND3, ND7, ND9 and RPS12) by utilizing its RNA editing system. It was proposed that each of these genes possess two fully extended open reading frames where only one is used in the insect environment and the other is used in the mammalian environment which creates a selective pressure to maintain the genetic material during both stages. To verify what previous research has suggested, we will be isolating mRNA transcripts from CR3, ND7, and RPSR12 to assess whether long poly AU tails have been added, signifying that the mRNA has in fact been edited. We will also be analyzing previously existing deep sequence data for these genes to determine if other possible alternative edits exist.

CELL-TYPE-SPECIFIC RESPONSES OF TCDD-INDUCED CHANGES IN GENE EXPRESSION AND REACTION TO OXIDATIVE STRESS
John B LaPres (Ohio State University), Cole Jamieson (Ohio Wesleyan University)
Category & Time: Biochemistry and Molecular Biology, Section 7, 2:30 PM - 2:30 PM
Poster: 77
Mentor(s): John J LaPres (Biochemistry & Molecular Biology)

The Aryl hydrocarbon receptor (AHR) is a ligand activated transcription factor that responds to a broad range of ligands. Exogenous ligands for the AHR include several planar aromatic hydrocarbons, such as 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Putative endogenous ligands for the AHR include cholesterol and heme and tryptophan metabolites, such as kynurenine (KYN). Interestingly, several of these ligands are associated with the 18-kDA Translocator protein (TSPO). The goal of this project is to characterize the role of the AHR and TSPO in modulating the expression of genes that encode enzymes within the KYN metabolic pathway and determine if these changes correlate with cell-type-specific responses to oxidative stress. Quantitative reverse transcription polymerase chain reaction was used to assess mRNA expression in the hepatoma cell line, Hepa1c1c7, and the lung epithelial cell line, MLE12, following exposure to TCDD or PK11195 (a TSPO ligand). In addition, both cells were exposed to tellurite, a metal known to induce oxidative stress, in the presence and absence of the different ligands. Our results demonstrate that these cells do respond differently at the level of gene expression and response to tellurite-induced cytotoxicity. It appears the MLE12 cells are more sensitive to metal-induced oxidative stress. The mechanism of crosstalk between the AHR and TSPO within these cells and the possible role it plays in modulating tryptophan metabolites levels need to be determined. More importantly, it will be important to characterize how KYN and other tryptophan metabolites impact normal cellular function.

ANTIBIOTIC RESISTANCE OF ESCHERICHIA COLI AND AEROMONAS SPECIES ISOLATED FROM SAMPLES OF CANADIAN GEESE (BRANTA CANADENSIS) INFESTED DOG PARK IN EAST LANSING, MI
Kelsey Lobos (Michigan State University), Heather Heuer (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 7, 2:30 PM - 3:45 PM
Poster: 78
Mentor(s): Poorna Viswanathan (Microbiology & Molecular Genetics)

Antibiotics used to treat bacterial infections have become increasingly incapable of tending to their purpose due to the transfer of antibiotic resistant genes from bacteria to another. These antibiotic resistant bacteria thrive in the environment. Canadian geese (Branta canadensis) have increased in considerable numbers in areas such as dog parks where there is a lot of human activity along with their pets. Canadian geese feces have been reported to be carriers of antibiotic resistant bacteria and zoonotic pathogens. It is a concern since humans can encounter them by exposure to geese feces. Dogs can also pick up these antibiotic resistant bacteria and carry them into even the cleanest of homes. With an increase of 20% in the past five years, off-leash dog parks are growing faster than any other type of park in America's largest cities. In the present work, geese fecal samples were collected from Northern Tail Dog Park in East Lansing, MI. Antibiotic resistance of two isolates E. Coli and Aeromans sp were studied. Kirby Bauer test showed that they were resistant to multiple antibiotics. The occurrence of resistant genes for beta-lactam and tetracycline class of antibiotics from these samples were determined using PCR. Beta-lactam and tetracycline resistance genes were present in 100% and 25% of the isolates respectively. Further investigations will be needed to come to conclusions about how these bacteria are transferred indirectly to humans by dogs that encounter Canadian geese feces and the role this plays in human health.

SMALL PEPTIDE SIGNALING PATHWAYS INVOLVED IN PLANT SULFUR RESPONSES
Katherine Martinez (State University of New York Oneonta)
Category & Time: Biochemistry and Molecular Biology, Section 7, 2:30 PM - 3:45 PM
Poster: 79
Mentor(s): Anne-Sophie Bohrer (Biochemistry & Molecular Biology), Katerina Lay (Genetics)

Macronutrients such as nitrogen (N), phosphorous (P), and sulfur (S) are essential for growth and development of plants in the environment. The plant genome contains several hundreds of gene encoding small peptides with 100-200 amino acids in size that are implicated to have signaling functions in mature forms as small signaling peptides (SSP) following posttranslational processing and modifications. Only a few SSPs and receptors have been identified and characterized despite their significance in macronutrient uptake being suggested based on their functions affecting root development. A group of CLE peptides highly expressed in Arabidopsis roots, binding to their receptor-like kinase CLAVATA1 (CLV1) under low-N conditions is an example of a SSP-driven signaling pathways relevant to plant root N responses, where it plays an essential role in repressing lateral root emergence from the primary root to prevent expansion of the root system in N-poor soils. In this study, we focused on investigating the functions of SSPs expressed in response to changes in S conditions. Transcriptome analyses indicated that atCLE2 in Arabidopsis and MtCLE45 in Medicago truncatula were homologous SSPs repressed under S deficiency, whereas AtCAPE4 and MtCAPE3 were the homologs induced under S deficiency with their gene expression levels restored to basal levels once S was resupplied. Candidates for CAPE receptor (CAPER) were additionally identified through transcriptome analyses. Gene expression analyses using quantitative real-time PCR and promoter luciferase reporter systems are being conducted to verify CLE-CLV1 and CAPE-CAPER SSP-receptor relationships and to investigate their downstream effects of S-responsive genes.

INHIBITING THE SRF:MRTF INTERACTION IN A BIOCHEMICAL ASSAY
Shane Mecca (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 7, 2:30 PM - 3:45 PM
Poster: 80
Mentor(s): Erika Lisabeth (Pharmacology & Toxicology)

MRTF-A (Myocardin-related Transcription Factor) is a transcriptional co-factor whose activity is dependent on F-actin polymerization, thereupon translocating to the nucleus and binding to SRF (Serum Response Factor) and activating transcription. Depletion of either SRF or MRTF has been shown to reduce cell adhesion, motility, and invasion without affecting proliferation in melanoma and breast cancer cell cultures. Furthermore, induced MRTF knockout mice reduced bleomycin fibrosis and melanoma metastasis. Our goal was to develop a biochemical assay using ALPHA technology in order to observe this interaction using purified SRF and a biotinylated MRTF-A peptide. Through the course of this project, we have optimized and miniaturized this assay, and shown that this assay is specific for peptide binding, as well as the importance of the DNA binding of SRF. In the future, we would like to begin a small-scale screen with chemical compounds that could potentially inhibit this interaction. Further development of these compounds could potentially act as MRTF/SRF chemical probes and/or therapeutics for fibrosis and cancer.

MATHEMATICAL MODELING OF SKELETAL MUSCLE ENERGETICS
William Millar (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 7, 2:30 PM - 3:45 PM
Poster: 81
Mentor(s): Jason Bazil (Physiology)

Cellular bioenergetic pathways, such as those involved with muscle function, are difficult to experimentally monitor and characterize, but computer modeling can provide physiologists with a useful tool they can use to analyze these complex metabolic processes. Here we modified a previously published model of oxidative phosphorylation to include new expressions for proton leak, ATP production, and phosphocreatine dynamics. The model consists of all the major metabolic processes involved in ATP production, redox homeostasis, and oxygen consumption. The model was recalibrated using the original experimental data and used to simulate new data on in vivo skeletal muscle energetics. These new data consist of phosphocreatine dynamics as a function of work intensity and duration. Consistent with these data, the model simulates a monotonic decrease in phosphocreatine levels as exercise intensity decreases. The model was then used to predict the effect of dichloroacetate, an activator of the pyruvate dehydrogenase complex, on the phosphoenergetic dynamics of exercising skeletal muscle. In these simulations, the model correctly predicted higher levels of phosphocreatine in the dichloroacetate treated muscle relative to untreated muscle. This increase is due to more available reducing equivalents capable of supporting higher levels of ATP production. Future applications of this model include gathering a deeper understanding of ischemic and diabetic conditions.

METABOLIC GAPFILLING IN ZYMOMONAS MOBILIS
Piyush Nanda (Indian Institute of Technology Kharagpur)
Category & Time: Biochemistry and Molecular Biology, Section 8, 2:30 PM - 3:45 PM
Poster: 85
Mentor(s): Magdalena Felczak (Biochemistry & Molecular Biology), Michaela TerAvest (Biochemistry & Molecular Biology)

Zymomonas mobilis has emerged as a potential candidate for conversion of biomass extracts into biofuels. It has a high sugar uptake rate and ethanol tolerance. However, obstacles remain in replacing yeast with Z. mobilis in the biofuel market. One of the main challenges is that its metabolism is poorly understood, causing difficulty in metabolic engineering for production of higher-value compounds. Based on genomic annotation, Z. mobilis appears to be missing many important portions of metabolism and hence directs all its carbon toward ethanol, rather than growth. The resulting low growth yield can also become a problem for generating enough Z. mobilis biomass for high-rate fuel production. Therefore, in the course of this research, we incorporated E. coli K12 genes to fill these apparent ‘gaps’ in Z. mobilis

metabolism to increase growth and better understand its native metabolism. We chose genes that were predicted to enhance growth at the expense of ethanol production by a Z. mobilis metabolic model. We were successful in expressing missing genes in carbohydrate and amino acid metabolism pathway. The effect of such gene incorporation was evaluated by HPLC and growth rate measurements. In the future, we will express these genes from a regulated system where the genes can be repressed once the organism will reaches a high biomass density. This will eventually result in improved production strains with programmable control of biomass versus fuel production.

STRUCTURE AND FUNCTION STUDIES OF DOSS WITH ARTEMISININ-LIKE COMPOUNDS
Sharon-Rose Nartey (University of Notre Dame)
Category & Time: Biochemistry and Molecular Biology, Section 8, 2:30 PM - 3:45 PM
Poster: 86
Mentor(s): Robert Abramovitch (Microbiology & Molecular Genetics), Huiqing Zheng (Microbiology & Molecular Genetics)

Mycobacterium tuberculosis (Mtb) is an airborne pathogen that infects more than one third of the human population. Phagocytized by host's lung alveolar macrophages, it triggers an immune response that leads to the formation of a fibrous cuff. This cuff, the granuloma, forms around the newly phagocytized Mtb, depletes its oxygen sources, and prevents further replication- leading to a condition known as non-replicating persistence (NRP). NRP allows Mtb to become tolerant to antibiotics. The DosRST two-component regulatory system is essential in the establishment of NRP in Mtb. DosS and DosT sensor kinases are activated in response to hypoxic conditions, carbon monoxide, or nitric oxide, and phosphorylate the DosR response regulator to induce the DosRST regulon. In an effort to inhibit the Mtb NRP, we previously performed a high throughput screen of >540,000 small molecules to target the DosRST pathway. Novel DosRST inhibitors, such as Artemisinin, were identified and characterized. We showed that Artemisinin targets the heme of DosST by modulating heme redox status and alkylating heme. Here, we characterize Artemisinin analogs and ozonides, for their ability to modulate the heme of the DosS protein. To conduct this experiment, DosS protein is expressed and purified from E.coli. Then, using UV-vis spectroscopy, the redox states of its heme are studied in response to compounds. The compound GC003 can modulate the redox status of DosS as Artemisinin, however, the ozonide compound OZ78 does not modulate the heme. Further testing with mass spectrometry is necessary to determine if OZ78 alkylates the DosS heme.

NOVEL ASSAY FOR TAU AGGREGATION IN ALZHEIMER'S DISEASE
Tyler Natof (University of Illinois at Urbana-Champaign)
Category & Time: Biochemistry and Molecular Biology, Section 8, 2:30 PM - 3:45 PM
Poster: 87
Mentor(s): Min-Hao Kuo (Biochemistry & Molecular Biology)

Alzheimer's Disease (AD) diminishes patients' memory, motor skills, and social function, drastically reducing quality of life. Currently, 5 million Americans have AD, highlighting the need for new treatments. A primary component of AD etiology involves the microtubule-associated protein tau. In the brains of AD patients, tau hyper-phosphorylation decreases tau's affinity for microtubules. Unbound to microtubules, tau aggregates into insoluble plaques known as neurofibrillary tangles (NFTs). It is unknown whether the hyper-phosphorylation of tau directly causes NFT's, but it is believed that decreasing the hyper-phosphorylation of tau would allay AD symptoms. Traditionally, unmodified tau is used in screens for compounds that inhibit tau aggregation. Because the pathogenic isoform of tau is hyper phosphorylated tau (p-tau), aggregation assays using p-tau rather than other isoforms should have greater specificity. Here, we describe an assay to visualize and quantify the aggregation of p-tau. Hyper-phosphorylated tau, 6 μM, was left to aggregate at 37 °C, with samples taken at 0, 6, and 24 hours. Aggregation product was treated with formaldehyde and run on BN-PAGE to compare the migration distances of each aggregation product. This method validates the principle of using decreased tau aggregation as the criterion for efficacy in high-throughput screens of pharmacological compounds to treat AD. New drugs to delay the onset of AD would have a significant social benefit, considering that the cost of treating AD patients is expected to exceed 1 trillion dollars per year by 2050.

USE OF A POPULATION-GUIDED APPROACH TO IDENTIFY NOVEL GENETIC MODULATORS OF TCDD-INDUCED LIVER TOXICITY
David Nava (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 8, 2:30 PM - 3:45 PM
Poster: 88
Mentor(s): Peter Dornbos (Biochemistry & Molecular Biology), John LaPres (Biochemistry & Molecular Biology)

2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is a persistent and pervasive environmental toxicant that has been linked to wide array of disease states including cancer, immunosuppression, diabetes, and metabolic syndrome. TCDD-induced toxicity is mediated through the aryl hydrocarbon-receptor (AHR), a ligand-activated transcription factor. Previous studies have indicated that individuals respond differently to TCDD. This study aims to identify potential genetic variations that are associated with an individual's susceptibility to TCDD-induced toxicity. We are using a genetically diverse mouse panel to model the human population. 15 strains of inbred mice were dosed with 0, 10 or 100 ng/kg of TCDD for 8 consecutive days. Liver samples were collected following the dosing regime. RNA was extracted using Trizol per the manufacturer's instructions. RNA quality was assessed using an ND-1000 spectrophotometer. A Nanostring nCounter will be used to measure the expression levels of 9 AHR-target genes for each strain and dose. We expect to see varying levels of AHR-target gene expression amongst the 15 differing strains. Such differences will be used to scan for quantitative trait loci (QTL) which may indicate regions of the mouse strains genome associated with the differing AHR-mediated response. The results from this study have the potential to identify genetic variants within the population that explain an individual's susceptibility to TCDD-induced toxicity. Thus, the results will likely have direct implications within risk-assessment. Furthermore, this model is at the heart of precision medicine and can be extrapolated to identify safe levels of other chemical exposures within the human population.

IDENTIFYING THE FUNCTION AND PHYSIOLOGICAL RELEVANCE OF ORANGE CAROTENOID PROTEIN HOMOLOGS IN FREMYELLA DIPLOSIPHON
Briana Nunez (Brown University)
Category & Time: Biochemistry and Molecular Biology, Section 8, 2:30 PM - 3:45 PM
Poster: 89
Mentor(s): Preston Dilbeck (Biochemistry & Molecular Biology), Beronda L Montgomery (Biochemistry & Molecular Biology)

All organisms have physiological mechanisms to deal with environmental stresses, but these mechanisms are especially important in organisms that have limited mobility in their environments. Fremyella diplosiphon is a filamentous cyanobacterium that is used as a model organism to study complementary chromatic adaptation (CCA), the ability to acclimate to differences in light quality. While light is essential for photosynthetic organisms, excess light can cause cellular damage. Orange Carotenoid Protein (OCP) is a protein involved in light protection through non-photochemical quenching of light-harvesting complexes, i.e., the phycobilisome. Most research on OCP has been conducted with Synechocystis sp. PCC 6803, which has a single copy of the OCP gene, although many other cyanobacteria have multiple homologs. In F. diplosiphon, there are 2 full length homologs of OCP, 3 homologs of the N-terminal domain, and 1 homolog of the C-terminal domain; the functions of these homologs are unknown. Previous research has found that mutants lacking RcaE (the red light sensor that regulates the CCA pathway) have differential expression of ocp homolog genes under varying light conditions. This suggests that the functions of the OCP homologs may be related to the CCA pathway. To assess this, expression of ocp homologs has been assessed in △rcaC mutants lacking the RcaC transcription factor downstream of RcaE in the CCA pathway. The goals of this research include characterizing the functions of the OCP homologs and further understanding of the potential relationship between OCP and CCA to better understand stress responses in F. diplosiphon.

THE EFFECT OF ADHERED FIBRINOGEN ON EXPRESSION OF THE ANTI-INFLAMMATORY CYTOKINE INTERLEUKIN-10 BY MACROPHAGES
Yolymar Oquendo (University of Puerto Rico at Cayey)
Category & Time: Biochemistry and Molecular Biology, Section 8, 2:30 PM - 3:45 PM
Poster: 90
Mentor(s): James P Luyendyk (Pathobiology and Diagnostic Investigation), Asmita Pant (Pathobiology and Diagnostic Investigation)

Fibrinogen in plasma is enzymatically converted to fibrin clots by the serine protease thrombin, a process central to clot formation and maintenance of normal hemostasis. This event also increases the affinity of the fibrin molecule for the leukocyte integrin αMβ2, a key non-hemostatic function of fibrin. The fibrin-alphaMbeta2 interaction is known to contribute to proinflammatory cytokine production in several inflammatory diseases, but its effect on anti-inflammatory cytokine expression is not known. We determined the effect of surface adhered fibrinogen (behaves as αMβ2 ligand) on the expression of the anti-inflammatory cytokines by macrophages. Specifically, we hypothesized that binding of fibrinogen to the receptor alphaMbeta2 on macrophages suppresses expression of the IL-10. To test this hypothesis we used cultured immortalized macrophages (RAW 264.7 cells) and primary mouse bone marrow macrophages (BMMs) on either uncoated (control) or fibrinogen-coated (10 or 100 ug/ml) cell culture plates. Expression of IL-10 mRNA and IL-10 protein in culture medium was examined various time points after adherence by qRT-PCR and ELISA, respectively. We anticipate that fibrinogen will suppress IL-10 expression in cultured macrophages, a result consistent with the proinflammatory function of fibrinogen. This result would suggest the possibility that fibrinogen not only directly promotes inflammatory cytokines, but could indirectly exaggerate inflammation by suppressing the inflammatory response.

MICROFLUIDIC APPROACH TO MEASUREMENTS OF CELLULAR RESPIRATION
David Pegouske (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 9, 2:30 PM - 3:45 PM
Poster: 93
Mentor(s): Sandra Hammer (Physiology), Yan Levitsky (Physiology), Denis Proshlyakov (Chemistry)

Measuring cellular respiration provides insight into the health of cells. This measurement provides an avenue for detecting and studying diseases where significant deviations in the rates of oxygen consumption indicate abnormal operations within the cell. Current techniques used to analyze oxygen consumption have several significant limitations, such as those due to high cost, time necessary to complete experiments or largely, the quantity of cells necessary to measure respiration rates. We sought to develop a method of measuring cellular respiration using a microfluidic chamber resulting in increased efficiency of both time and materials. The chamber is manufactured using transparent plastic and utilizes a platinum porphyrin patch to allow remote detection of oxygen within. Initial work with whole ARPE-19 cells indicates a detection range between 30,000 and 200,000 cells loaded into the microfluidic chamber where a linear dependence between the number of cells loaded and oxygen consumption rates can be detected. Preliminary results indicate this limit of detection is two orders of magnitude better than other commonly used techniques where roughly four million cells are required for detection. Results also demonstrate that the microfluidic chamber allows for detection of rates to be observed within minutes of injection. Improvements of this device include increasing efficiency within the field of cellular respiration measurements. Beyond lesser material and higher throughput as described above, the instrument is small, mobile, and cost effective. These improvements allow for the possibility of effectively measuring oxygen consumption in human and small animal tissues.

DETERMINATION OF BINDING AFFINITY BETWEEN AN ANTIBIOTIC RESISTANCE ENZYME AND FRAGMENT-BASED INHIBITORS

Uyen Pham (Grand Valley State University)

Category & Time: Biochemistry and Molecular Biology, Section 9, 2:30 PM - 3:45 PM
Poster: 94
Mentor(s): Rachel Powers (Biochemistry & Molecular Biology)

Since their introduction in the 1940's, beta-lactams have been the most prescribed antibiotic due to their effectiveness, low cost and minimal side effects. Extensive and irresponsible use of antibiotics has contributed to the emergence of several defense mechanisms that bacteria utilize to counteract the activity of beta-lactam antibiotics. The most concerning is the production of beta-lactamase enzymes that catalyze the hydrolysis of the amide bond in the defining four-membered beta-lactam ring, inactivating the antibiotic before it reaches its transpeptidase target in the bacterial cytoplasmic cell wall. One way to suppress the action of beta-lactamase enzymes and overcome resistance is by identifying novel inhibitors that do not share a lactam ring. Class D beta-lactamases, also called OXAs, can hydrolyze oxacillins, cephalosporins, and carbapenems, posing a significant clinical threat due to the lack of inhibitors for these enzymes. The carbapenem-hydrolyzing class D beta-lactamases (CHDLs), of which OXA-24 is a characteristic member, are an important subgroup of this class that possess carbapenem resistance. Previous work in the lab used the program DOCK and identified a lead fragment molecule (NK3) that inhibited OXA-24 beta-lactamase (Ki 5.77 mM). Kinetic assays of analogs of NK3 were obtained to determine their binding affinity with OXA-24. Of the five analogs tested, NK3D (Ki 1.08 mM) and NK3E (Ki 1.94 mM) showed improved binding affinity to beta-lactamase. With further optimization and improvement, NK3 fragments have the potential to become a new series of class D beta-lactamase inhibitors that are unaffected by current resistance mechanisms.

THE ELECTROCHEMICAL DETECTION OF PEROXYNITRITE USING CHEMICALLY MODIFIED DIAMOND ELECTRODES

Yamilka Rios-Guadalupe (Universidad de Puerto Rico Humacao)

Category & Time: Biochemistry and Molecular Biology, Section 9, 2:30 PM - 3:45 PM
Poster: 95
Mentor(s): Serban Peteu (Chemistry), Greg Swain (Chemistry)

Peroxynitrite (PON, ONOO-) is a major oxidative agent with cytotoxic effects. It is generated from the reaction of nitric oxide (NO) and superoxide radical (O2-). This molecule is related to a wide range of physiological and pathological processes such as diabetes, cancer, chronic inflammatory diseases and neurodegenerative disorders. Many techniques have been developed for the detection of PON including fluorescence probing, nitrotyrosine detection and electrochemical sensors. Since PON is very difficult to detect in vivo due to its sub-second lifetime and high reactiveness at physiological pH, electrochemical sensors offer advantages for the selective real-time detection and quantification of PON. Such sensors could potentially be integrated into breath analyzers and used to detect and quantify PON in exhaled breath condensate. PON is a useful biomarker of respiratory diseases, particularly those that involve oxidative or nitrosative stress. In this investigation, chemically-modified diamond electrodes were fabricated and used to detect PON. The electrodes were modified with hemin and hemin + polyethylenedioxythiophene (PEDOT) films electro-polymerized onto the electrode surface. PON was generated from 3-morpholino-sydnonimine (SIN-1) and detected in phosphate-buffered saline (PBS) solution at pH 7.4. Hemin was used as a catalytic agent for the oxidation of PON, while EDOT created a synergy with hemin and improved its entrapment on the electrode. The electrochemical response of the sensors to PON was studied using cyclic voltammetry and continuous amperometry. From these tests, detection figures of merit including response time, linear dynamic range, sensitivity, detection limit and stability were determined. The presentation will review these findings.

ROLE OF LATERAL HYPOTHALAMIC NEUROTENSIN NEURONS IN DRINKING BEHAVIOR

Cristina Rivera (University of Puerto Rico at Cayey)

Category & Time: Biochemistry and Molecular Biology, Section 9, 2:30 PM - 3:45 PM
Poster: 96
Mentor(s): Gizem Kurt (Physiology)

The lateral hypothalamic area (LHA) is a cellularly heterogeneous brain area that coordinates feeding and drinking behaviors necessary for survival. While the previously described populations of LHA neurons modify feeding, they fail to explain how the LHA coordinates drinking behavior. Recently, however, the Leinninger lab has identified LHA neurons that expresses the neuropeptide Neurotensin (Nts), and experimental activation of these "LHA Nts neurons" promotes voracious water intake. Furthermore, LHA Nts neurons project to the lateral preoptic area (LPO), a brain region known for its role in regulating drinking behavior. We therefore hypothesize that LHA Nts neurons are required to direct physiologic drinking behavior, and they do so via Nts signaling in the LPO. Since Nts signals via the Neurotensin Receptor-1 (NtsR1) and/or -2 (NtsR2), we will identify which receptor isoform is present in the LPO by examining mice that express green fluorescent protein in NtsR1 or NtsR2-expressing cells. Receptor expression will be confirmed via RNAScope labeling. Next, we will use inhibitory designer receptors exclusively activated by designer drugs (DREADDs) to inhibit LHA Nts neurons and determine whether they are necessary for physiologic drinking behavior. Collectively, these data will provide cellular and behavior-level understanding of how LHA Nts neurons control drinking behavior, which could lead to more effective treatment options of water intake disorders that endanger health.

INVESTIGATING THE INTERACTION OF NEUROTENSIN AND OREXIN NEURONS WITHIN THE BRAIN
Andrew Sagante (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 9, 2:30 PM - 3:45 PM
Poster: 97
Mentor(s): Juliette Brown (Pharmacology & Toxicology), Gina Leinninger (Physiology)

The lateral hypothalamic area (LHA) of the brain regulates body weight via incompletely understood mechanisms, and contains separate populations of neurons that express the anorectic neuropeptide, neurotensin (Nts) or the orexigenic neuropeptide, orexin (OX). Intriguingly, LHA Nts neurons project to LHA OX neurons, so these two populations may interdependently modify weight. Indeed, preventing activation of LHA Nts neurons in mice also disrupts OX function and leads to weight gain. I therefore hypothesize that LHA Nts neurons are required for the function of downstream OX neurons, thus loss of LHA Nts neurons will also cause degeneration of OX neurons. To investigate, I injected NtsCre mice in the LHA with either a control AAV (sham injection) or an AAV that causes Cre-mediated expression of the diphtheria toxin subunit A (AAV-DTA). This method selectively ablated LHA Nts neurons within 2 wks, but immunostaining confirmed that OX neurons were intact. However, by 10 wk there was reduced immunostaining for OX and DLK1 (a marker of LHA OX neurons), suggesting that OX neurons degenerated after the loss of LHA Nts neurons. To confirm these findings, I am quantifying LHA gene expression of Nts and OX at 2 and 10 wk after LHA injection of Control and AAV-DTA. At the conclusion of these studies I will understand the molecular and circuit consequences that result from loss of LHA Nts neurons, and how disruption of LHA neurons may contribute to the development of weight imbalances, including obesity or eating disorders.

SYNTHESIS AND PRELIMINARY INVESTIGATION OF THREE-MEMBERED AZAHETEROCYCLES AS BIOCATALYTIC SUBSTRATES AND POTENTIAL ENZYME INHIBITORS
Brendyn Smith (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 9, 2:30 PM - 3:45 PM
Poster: 98
Mentor(s): Neal Hammer (Microbiology & Molecular Genetics), Prakash Shee (Chemistry), Kevin Walker (Chemistry), Tyler Walter (Chemistry)

Nitrogen-containing heterocycles ('*aza*' prefix) are among some of the most important chemical functional groups in Nature and the pharmaceutical industry. Azirines are an interesting class of three-membered azaheterocycles that are rarely found in Nature and are currently underexplored in chemical biology. Our group has previously discovered that *Tc*PAM, an aminomutase from *Taxus canadensis*, is capable of ring opening aryl epoxides (three-membered oxygen heterocycle) into chiral phenylserine analogues with styrylalanine as an amine group donor. It has been hypothesized that similar reactivity can occur with azirines. Plausible biosynthetic products would include β-keto-□-amino acids or diamino acids, which are useful building blocks in medicinally relevant compounds. Inhibition of *Tc*PAM by the azirine through forming an irreversible aminated aziridine adduct is also feasible. In addition, our group is interested in exploring these same azirines as potential aza analogues of the antibiotic Fosfomycin, an epoxide phosphonate that inhibits an enzyme involved with peptidoglycan biosynthesis in pathogenic bacteria called MurA. Azirine ester intermediates (epoxide mimics) were tested in preliminary biological trials as potential antibiotics against *Staphylococcus aureus*. Nearly all the reported azirines have been synthesized as esters and not as carboxylates. Carboxylates have an advantage over esters in that they are capable of forming salt-bridge interactions in active sites, just like the phosphonate Fosfomycin. Salt-bridge interactions can greatly increase their efficacy as enzyme inhibitors or increase the efficiency of biocatalytic reactions. Therefore, we explored various routes to make carboxylate azirines from isoxazol-5-ols via an iron (II)-catalyzed isomerization and from *O*-tosyl oximes through Neber reactions.

USING A HIGH THROUGHPUT GENETIC SCREEN TO IDENTIFY AMINO ACIDS IN VPSR INVOLVED IN BINDING TO C-DI-GMP IN VIBRIO CHOLERAE
Hannah Smith (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 10, 2:30 PM - 3:45 PM
Poster: 100
Mentor(s): Meng-Lun Hsieh (Biochemistry & Molecular Biology), Christopher Waters (Microbiology & Molecular Genetics)

Biofilms are complex communities of bacteria that aggregate through the production of extracellular polymeric substances (EPS). Bacterial biofilm formation is tightly regulated by chemical signaling molecules. In Vibrio cholerae, the Gram negative pathogen that is the causative agent of the devastating disease cholera, regulation of biofilm production is controlled by several different chemical signaling systems. One of these is via the second messenger molecule cyclic di-GMP (c-di-GMP). C-di-GMP allows bacteria to sense, respond, and adapt to changing environmental conditions, and is known to activate biofilm formation in V. cholerae. Increased levels of c-di-GMP directly bind to the transcription factor VpsR in V. cholerae. VpsR bound to c-di-GMP induces transcription of the polysaccharide biosynthesis operon. However, the molecular mechanism by which c-di-GMP binds to VpsR is not known. Random, non-biased mutations were made in vpsR using error-prone PCR and subsequently used in a high-throughput screen to identify VpsR proteins that no longer responded to c-di-GMP. Sequencing of these mutations identified amino acids in VpsR potentially necessary for binding to c-di-GMP. Single amino acid mutations of interest were re-created using site-directed mutagenesis and their phenotypes were confirmed using reporter luminescence assays. The ultimate goal of this research is to determine the amino acids in the c-di-GMP binding pocket of VpsR to better understand how c-di-GMP regulates biofilm formation in V. cholerae.

CO2 REGULATION OF ISOPRENE EMISSION FROM PLANTS
Christine Solomon (Grinnell College)
Category & Time: Biochemistry and Molecular Biology, Section 10, 2:30 PM - 3:45 PM
Poster: 101
Mentor(s): Alexandra Lantz (Biochemistry & Molecular Biology), Thomas D Sharkey (Biochemistry & Molecular Biology)

Isoprene emitted from plants increases their resilience to oxidative and temperature stress, but isoprene can react with NO_x in the atmosphere to form ozone and increase the lifetime of methane. Isoprene emission increases with temperature, but decreases with CO_2. This research addresses three questions: (1) How will future climate scenarios, which predict greater temperature averages and CO_2 concentrations, impact global isoprene emission? (2) What is the mechanism of CO_2 regulation of isoprene emission? (3) How does CO_2 regulation of isoprene emission vary by species? To determine how CO_2 regulates isoprene emission, we measured photosynthetic variables and isoprene emission by gas exchange analysis and the photosynthetic electron transport rate (ETR) using chlorophyll fluorescence at varying temperatures and CO_2 concentrations. We analyzed the concentration of metabolites in the isoprene-producing non-mevalonic pathway (MEP) with mass spectrometry. The ETR correlated with isoprene emission as CO_2 increased, supporting the hypothesis that at high concentrations of CO_2 and low temperatures, the triose phosphate utilization limitation of photosynthesis suppressed isoprene emission. We also found that this effect differed among species. The results support the hypothesis that isoprene emission from plants will increase in predicted future atmospheric conditions.

VALIDATION OF THE SPECIFICITY OF AN ANTIBODY AGAINST THE IMPORTANT MYENTERIC NEURONAL MARKER, THE VESICULAR NUCLEOTIDE PROTEIN
Jazmin Sotomayor Ortiz (University of Puerto Rico at Humacao)
Category & Time: Biochemistry and Molecular Biology, Section 10, 2:30 PM - 3:45 PM
Poster: 102
Mentor(s): James Galligan (Pharmacology & Toxicology), Alberto L Perez-Medina (Pharmacology & Toxicology)

The enteric nervous system (ENS), known as “the little brain of the gut,” is the intrinsic network of neurons and nerve fibers embedded in the gut wall. The ENS is composed of the myenteric and submucosal plexuses; the myenteric plexus controls gut motility, and the submucosal plexus controls secretion. The myenteric plexus contains nerves that release acetylcholine to cause muscle contraction and nerves that release ATP to cause muscle relaxation. ATP is the energy molecule that is found in every cell. However, in nerves, ATP is packaged into synaptic vesicles by the vesicular nucleotide transporter (VNUT). We will test the hypothesis that an antibody against VNUT will identify the inhibitory ATP (purinergic) nerves in the myenteric plexus, using immunohistochemistry methods, fluorescence microscopy, and the VNUT antibody to localize purinergic nerves in the mouse gastrointestinal (GI) tract. We will also verify the specificity of the VNUT antibody using immunocytochemistry and western blot to confirm siRNA knockdown of endogenously expressed VNUT in PC12 cells. We anticipate that the VNUT antibody will identify purinergic nerves in the muscle layers of the mouse GI tract, and that siRNA knockdown will eliminate VNUT labelling in PC12 cells. These studies will validate the specificity of the VNUT antibody for its target antigen. The VNUT antibody will be an important new tool for studying the ENS, and will help us better understand the function of the ENS both in health and disease.

IN VIVO METHYLMERCURY EXPOSURE INTERACTS WITH THE GENETIC PREDISPOSITION TO AMYOTROPHIC LATERAL SCLEROSIS IN MICE EXPRESSING THE HUMAN CU2+/ZN2+ DIMUTASE 1 MUTATION
Jake Spitsbergen (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 10, 2:30 PM - 3:45 PM
Poster: 103
Mentor(s): William Atchison (Pharmacology & Toxicology), Jordan Bailey (Pharmacology & Toxicology)

Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease that leads to damage to motor neurons throughout the body. The environmental toxicant methylmercury (MeHg) is known to cause damage similar to that seen in ALS. ALS is modeled using mice expressing the Cu^{2+}/Zn^{2+} superoxide dismutase 1 (hSOD1) gene mutation ($SOD1^{G93A}$). These mice express phenotypes similar to those found in ALS patients as they age. This mouse model can be used to effectively display a possible gene X environment interaction between ALS and environmental exposure to MeHg. $SOD1^{G93A}$, $SOD1^{HuWT}$, and wild type mice were exposed *in vivo* to MeHg via their drinking water at a concentration of 3ppm. The mice were monitored closely by weight and hind limb cross three times weekly as well as running a speed test on Digigait once per week to measure the maximum speed each mouse was able to achieve without failure. Mice from each genetic group were sacrificed at post natal day (PND) 28,47,64, and 84 for spinal cord slices to be viewed under a confocal microscope to monitor Ca^{2+} proliferation in the spinal cord tissue. Preliminary data indicates that there is a decrease in mouse weight in all *in vivo* mice and in the $SOD1^{G93A}$ control mice between PND 64 and PND 84. Maximum attainable speed is also shown to decrease with age with a larger decline in all *in vivo* and $SOD1^{G93A}$ mice. It is predicted that *in vivo* mice and the $SOD1^{G93A}$ control mice will display a greater influx of Ca^{2+} under the confocal. There is predicted to be a greater increase in Ca^{2+} as the PND increases. These data suggest that environmental exposure to MeHg contributes to the expression of the ALS phenotype of neural degeneration.

ACUTE MEHG EXPOSURE ALTERS IMMUNOFLORESCENCE OF THE RENSHAW CELL AREA IN THE C57BL6J MOUSE MODEL

Adrianna Suazo (Northern New Mexico College)

Category & Time: Biochemistry and Molecular Biology, Section 10, 2:30 PM - 3:45 PM
Poster: 104
Mentor(s): William Atchison (Pharmacology & Toxicology), Monica Rios-Cabanillas (Pharmacology & Toxicology)

Methylmercury (MeHg) is stemming from the release of mercury vapor from volcanic eruptions and industries into the environment is followed by a chemical reaction with methanogenic bacteria that produces methylmercury (MeHg). MeHg is a bioaccumulative neurotoxicant of current concern. MeHg biomagnifies as it travels up the seafood food chain and it crosses the blood brain barrier producing toxic effects on many cell types. We hypothesize that acute (1hr) exposure to [0, 5, 10, 20 and 50 μM MeHg] will differentially affect renshaw interneurons and motor neurons located in the lumbar region of the spinal cord from the C57BL6J adult mouse model. MeHg-toxicity to these cells will disrupt excitatory and inhibitory signaling involved during muscle movement. To determine the extent that MeHg mediates cellular toxicity, immunohistochemistry (IHC) technique was performed. The renshaw and motor neuron area is determined by the characteristic presence of gephyrin clusters, calbindin d28k immunoreactivity and the presence of cholinergic contacts. Primary antibodies against these markers, gephyrin, calbindin d28k and ChAT, respectively,were used. All three antibodies at 5μM MeHg markedly decreased immunofluorescence from control. At higher [MeHg] ChAT mean fluorescence increased from control but calbindin immunofluorescence decreased from control. It is important to understand MeHg-mediated neurotoxicity because it may serve as a model to mimic how renshaw and motor neurons are affected in the neurodegenerative disease of amyotrophic lateral sclerosis.

IDENTIFICATION OF PLANT-DERIVED COMPOUNDS TO TREAT ALLERGIC DISORDERS

James Sykes (Saint Louis University)

Category & Time: Biochemistry and Molecular Biology, Section 10, 2:30 PM - 3:45 PM
Poster: 105
Mentor(s): Hariharan Subramanian (Physiology)

Mast cells (a particular type of immune cell) are critical mediators of allergic response in humans. Allergens or antigens bind to the IgE antibody occupied receptors (FcεRI) on mast cells resulting in their activation and rapid release of inflammatory mediators via process termed as “degranulation”. Thus, development of inhibitors that target the antigen- FcεRI pathway is clinically significant because these pharmacologic agents can then be used to treat patients with allergic disorders. Previous reports have demonstrated that crude extracts from several plants inhibit mast cell degranulation response to antigen. However, the lead plant-derived compounds that are responsible for this effect have not been identified yet. Therefore, the objective of my project is to test the role of 7 different plant based lead compounds (Osthole, Rutin, Forskolin, Quercetin, Betulinic acid, and Oleanolic Acid) in regulating FcεRI-mediated degranulation in mast cells. I will use a rat mast cell line (RBL-2H3) that expresses FcεRI and assess degranulation in response to IgE/antigen in the presence of varying concentrations of the plant compounds. The data obtained using this in vitro system will form the foundation for future studies that will use primary tissue-derived human and mouse mast cells and also for in vivo rodent allergy models.

ASSESSMENT OF MITOCHONDRIAL RESPIRATORY RATES USING MICROFLUIDIC ELECTROCHEMISTRY

Hoang Le Tran (Michigan State University)

Category & Time: Biochemistry and Molecular Biology, Section 11, 2:30 PM - 3:45 PM
Poster: 108
Mentor(s): Nathan Frantz (Chemistry), Yan Levitsky (Physiology), Denis Proshlyakov (Chemistry)

Mitochondrial respiratory rates are usually assessed by providing electron sources to the electron transport chain (ETC) resulting in the reduction of oxygen at complex IV. By measuring oxygen consumption rates, it is possible to obtain the overall respiratory rates of mitochondria, i.e the rate of the slowest step of the entire respiratory chain. Commonly used respirometers often are expensive, require large amounts of sample, and sometimes require specialized training. For this reason, a novel device has been developed that is simple, cost efficient, and most importantly, opens new possibilities to investigate mitochondrial metabolism. This new respirometer utilizes a microfluidic chamber of less than 3.5 microliters to achieve smaller sample volumes. Furthermore, the microfluidic respirometers are 3D printed, meaning they can be modified to suit changing experimental needs. Moreover, the addition of electrodes within the microfluidic chamber provides a unique capability to access the ETC in a manner that is not possible with existing methods. Assays of mitochondria, obtained from beef liver and rat heart, using this device have shown that it is possible to measure changes in oxygen concentration remotely using a platinum porphyrin fluorophore patch inside the chamber and a phase-shift fluorimeter. In addition, results indicate the modulation of oxygen consumption in the ETC, via cytochrome c and TMPD by changing applied potential, is possible. Here we report evidence that respirometry and electrochemistry can be used interchangeably and characterize the effects of applied potential and mediator concentrations with the intention of probing previously inaccessible mitochondrial mechanisms.

BINDING OF ADRENERGIC COMPOUNDS TO OPIOID RECEPTOR
Miah Turke (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 11, 2:30 PM - 3:45 PM
Poster: 109
Mentor(s): Robert Root-Bernstein (Physiology)

Root-Bernstein and Dillon have demonstrated that adrenergic receptors in the human body have opioid binding sites that enhance adrenergic activity. Conversely, we hypothesize that adrenergic compounds will bind to similar binding regions in the opioid receptor. It is shown that opioid and adrenergic compounds bind to one another, and can alter each other's physiological activity. This similarity proposes a molecularly complementary module between opioids and adrenergics that suggests dual-ligand control of these two classes of receptors. We've obtained purified opioid receptor and measure the binding of opioids and adrenergic compounds using UV Spectrophotometry.

COVALENT BINDING OF OPIOIDS TO GLUTATHIONE SUGGESTS SIMILAR BINDING TO GLUTATHIONE-LIKE REGIONS OF AMINERGIC RECEPTORS
Miah Turke (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 11, 2:30 PM - 3:45 PM
Poster: 110
Mentor(s): Robert Root-Bernstein (Physiology)

Glutathione-opioid adducts have been found in urine, and it has been shown that Met-Enkephalin forms covalent compounds with Glutathione. We have shown that Glutathione binds with a number of compounds such as Endomorphin, Met-Enkephalin, Naloxone, Morphine, and Ascorbate using UV Spectrophotometry. We assumed that the binding was non-covalent, but in light of the literature discussed, our new hypothesis is that there may be covalent binding happening between Glutathione and opioids in the body. In addition, we have demonstrated that some extracellular regions in aminergic receptors function like Glutathione, which could mean that opioids covalently bind to the receptors as well. We intend to test the covalent interaction hypothesis using ESI-QTOF MS.

THE EFFECT OF BUFFER COMPOSITION ON THE METABOLIC BEHAVIOR OF ISOLATED CARDIAC CAVIA PORCELLUS MITOCHONDRIA
Matt Vander Ploeg (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 11, 2:30 PM - 3:45 PM
Poster: 111
Mentor(s): Jason Bazil (Physiology)

In this study, we analyzed a variety of respiration buffer compositions and substrate combinations to determine the optimal conditions to support mitochondrial function. The buffers consisted of a standard KCl based buffer (B1) and three modified buffers with chloride replaced by the carboxylic acid gluconate (B3) or the sugar acid lactobionate and the antioxidant taurine (B2). The final buffer (B4) tested was identical to B2 except that lactobionate was replaced with gluconate. The substrate combinations consisted of metabolites that supported different pathways of mitochondrial metabolism. To test mitochondrial function, we used isolated cardiac guinea pig mitochondria and measured oxygen consumption for three metabolic states using an Oroboros Oxygraph-2k. These metabolic states were the leak state (energized mitochondria in the absence of adenylates), oxphos state (energized mitochondria in the presence of saturating ADP concentrations), and a submaximal stimulated state (energized mitochondria in the presence of ATP and extra-mitochondrial ATPases). We found that buffer B2 led to the highest rates of respiration for the oxphos state and the best respiratory control ratios (ratio of oxphos state/leak state) across all substrate combinations. Buffers B3 and B4 had approximately equal rates of oxygen consumption for the oxphos state and respiratory control ratios across all substrates; however, the average rates were slightly lower than the rates obtained with buffer B2. Buffer B1 yielded the lowest oxygen consumption rates and worst respiratory control ratios. Thus, buffers containing K-lactobionate and taurine are a superior choice for mitochondrial respiration studies compared to the K-gluconate and standard KCl buffers.

ACTIVATION OF MTORC-2 SIGNALING PROTECTS AGAINST KIDNEY DAMAGE IN HIGH FAT FED DAHL SALT SENSITIVE RATS
Antonio White (North Carolina Central University)
Category & Time: Biochemistry and Molecular Biology, Section 11, 2:30 PM - 3:45 PM
Poster: 112
Mentor(s): Roxanne Fernandes (Pharmacology & Toxicology), James Galligan (Pharmacology & Toxicology), Hui Xu (Pharmacology & Toxicology)

High blood pressure (hypertension) is a common disease affecting one third population over the age of 20 in the United States. Hypertension damages organs such as the heart, kidney and brain causing morbidity and mortality. Obesity is one cause of hypertension. In this study, we determined the role of mammalian target of rapamycin complex (mTORC) signaling pathways in inducing or protecting against kidney damage in high fat (HF) fed Dahl salt sensitive male and female rats. We hypothesize that HF diet activates MTORC-1 therefore lead to proliferation and fibrosis in kidney, but activation of MTORC-2 increases of cell survival and protects against the kidney from damage in HF fed rats. We determined the activities of MTORC-1 and MTORC-2 signaling in the kidneys of 24 week HF and control fed male and female rats, the expressions of pS6 (for mTORC 1) and pAKT (for mTORC 2) were measured by Western blot and immunohistochemistry. Histological studies revealed extensive kidney damage in HF males but not females although both HF males and females were hypertensive. By immunohistochemistry we found extensive accumulated pS6 in kidneys of HF males but not females. We also found highly pAKT expression in the kidneys of HF females but not males. .. Western blot showed increased pS6 levels in the kidneys of HF males but not females. Our studies supported the ideal that activation of mTORC 1 contributes to HF induced kidney damage in males but HF females are protected by highly activated mTORC2 in kidney.

MONOLIGNOL TRANSPORTER
Matthew Wirick (Michigan State University), Craig Luca (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 12, 2:30 PM - 3:45 PM
Poster: 115
Mentor(s): John Tran (Plant Biology), Curtis Wilkerson (Plant Biology)

Lignin is a complex organic molecule that comprises part of the secondary cell wall in vascular plants. Lignin is important in contributing rigidity and hydrophobicity to plant cells. The monomers of lignin, also known as monolignols, are formed via the general phenylpropanoid pathway in the cytoplasm. These monolignols are translocated from the cytoplasm to the apoplastic space where they become integrated into the cell wall. While the biosynthesis of lignin is becoming better understood as well as its incorporation into the cell wall, the process of monolignol translocation is not. We hypothesized that the translocation mechanism for these monolignols is mediated by transporter proteins. Using several co-expression analysis datasets, we found many T-DNA mutation lines of A. thaliana which we are in the process of screening to identify mutants that have differences from classic lignin phenotypes. Among these phenotypes, we will be looking at reductions in stem width, differences in lignin monomer composition, and increases in cell wall digestibility. With the discovery of a transporter protein for monolignols, we hope to advance technologies in biofuel research.

DEVELOPMENT OF A HIPPOCAMPAL CIRCUIT-SPECIFIC KNOCKOUT OF FOSB GENE
Alexis Wirtz (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 12, 2:30 PM - 3:45 PM
Poster: 116
Mentor(s): AJ Robison (Physiology)

Hippocampal (HPC) circuits, such as the neurons that extend from ventral HPC (vHPC) to nucleus accumbens (NAc), are important for memory and play a critical role in depression and addiction, however the molecular mechanisms underlying this are not understood. We have recently discovered a role for ΔFosB, a chronic activity-dependent transcription factor encoded by the FosB gene that drives gene expression underlying cellular function of HPC neurons. In order to better understand the role of ΔFosB in vHPC-NAc projection neurons, we sought to develop a mouse model with a knockout (KO) of the FosB gene. We mated a floxed FosB strain (FosBfl/fl) with a Cre driver line (Nts2-Cre) with expression in HPC in order to knockout (KO) ΔFosB in HPC. NtsR2-Cre-driven FosB KO mice had a lack of ΔFosB expression in sub granular neurons in the dentate gyrus of the hippocampus. These mice also displayed decreased memory and were susceptible to stress, similar to what we had previously found when we silenced ΔFosB transcriptional activity in HPC. We next injected a retrograde HSV-Cre into NAc to drive GFP expression and KO FosB in vHPC projections to this region and found that ΔFosB is induced in these projections by cocaine, which is blocked in FosB KO mice. Studies are currently ongoing to produce a circuit-specific KO. However, these preliminary findings indicate that ΔFosB is important for normal hippocampal function and its expression (and inhibition) in the HPC-NAc circuit may be specifically crucial to stress susceptibility and drug seeking.

DIFFERENTIAL MAST CELL RESPONSE BETWEEN TH1 (B6) AND TH2 (BALB/C) MICE IS REGULATED BY G-PROTEIN COUPLED RECEPTOR KINASE 2
Canchai Yang (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 12, 2:30 PM - 3:45 PM
Poster: 117
Mentor(s): Hariharan Subramanian (Physiology)

Allergic diseases such as asthma, rhinitis and food allergy affect millions of individuals and the prevalence of these diseases has been increasing worldwide. Individuals with a suppressive phenotype (Th2) are more prone to allergy as compared to those who are susceptible to a pro-inflammatory (Th1) response. Mast cells are tissue resident immune cells that play a critical role in mediating allergic responses. While it is known that mast cells cause allergic diseases, it is unknown if their responses are altered in Th2 susceptible individuals as compared to Th1 dominant humans. We hypothesized that Th2 skewed mast cells will respond more robustly as compared with Th1 type mast cells. Accordingly, our data suggested that mast cells from Balb/c (Th2) mice respond more robustly to allergen than mast cells from B6 (Th1) mice. We have previously demonstrated that G-Protein Coupled Receptor Kinase 2 (GRK2) enhances allergen responses in mast cells. To directly test whether the enhanced Balb/c mast response was attributable to GRK2 expression, we examined the levels of GRK2 in B6 and Balb/c mast cells following allergen stimulation. Preliminary analysis revealed that Balb/c mast cells demonstrated enhanced GRK2 levels compared to B6 mast cells. In conclusion, GRK2 expression levels may regulate mast cell responses and this might explain why Balb/c mast cells respond more than B6 mast cells.

DIVERSITY AND ABUNDANCE OF ARSENIC RESISTANT GENES IN SOIL MICROBIOMES
Susanna Yeh (University of Maryland College Park)
Category & Time: Biochemistry and Molecular Biology, Section 12, 2:30 PM - 3:45 PM
Poster: 118
Mentor(s): Taylor Dunivin (Microbiology & Molecular Genetics), Ashley Shade (Microbiology & Molecular Genetics)

Arsenic (As) is an ubiquitous toxic element, and its contamination of groundwater and food imperils human health. Bacterial As metabolism and resistance plays an important role in the As biogeochemical cycle, making them an important consideration for bioremediation and risk assessment. Several proteins facilitate As biotransformation: arsenite oxidase (AioAB), dissimilatory arsenate reductase (ArrAB), cytoplasmic arsenate reductase (ArsC), arsenite methyltransferase (ArsM), and arsenite efflux pumps (ACR3, ArsB). Several of these enzymes evolved before the bacterial archaeal divergence, making them interesting from an evolutionary perspective.To investigate the diversity and abundance of arsenic-resistant genes (AsRG), the relative abundance of AsRG in soil microbiomes from the USA, Malaysia, Russia, Brazil, and Canada were obtained from MG-RAST and compared. A gene-targeted metagenome assembler, Xander, was used to

assemble AsRG, their relative abundance were normalized to the single-copy gene rplB, and phylogenetic analysis was performed. Results from Xander gave each gene of interest a maximum percent identity of at least 96% and maximum assembled full length contigs for 6 genes of interest. Increased knowledge of the diversity of AsRG may have important evolutionary implications, and a more integrated understanding of the diversity and abundance of AsRG within soil communities sheds light on the potential impact of microbial communities on the As biogeochemical cycle and the risk to humans.

MECHANISMS OF HYPERTENSION-ASSOCIATED PARENCHYMAL ARTERIOLE IMPAIRED VASODILATION AND COGNITIVE FUNCTION
Ting-Chieh Yen (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 12, 2:30 PM - 3:45 PM
Poster: 119
Mentor(s): Janice Diaz-Otero (Pharmacology & Toxicology), Anne Dorrance (Pharmacology & Toxicology)

Hypertension impairs cerebral artery vasodilation which increases the risk for developing dementia. The parenchymal arterioles (PAs) regulate blood flow to the cerebral microcirculation and determine cerebrovascular resistance. PA dilation is impaired in hypertension and mineralocorticoid receptor (MR) antagonism prevents this. We hypothesized that impaired PA vasodilation is associated with oxidative stress and neuroinflammation caused by increased microglial density; these changes will lead to cognitive dysfunction. In addition, we hypothesized that MR antagonism would prevent hypertension-associated changes. 16 week old male C57bl/6 mice were treated with AngII (800ng/kg/min) ± the MR antagonist, eplerenone (EPL;100mg/kg/day) for 4 weeks; Sham mice served as control. AngII increased systolic blood pressure, an effect not blunted by EPL. Hypertension significantly increased microglial density; this was prevented by EPL treatment. Preliminary data shows that hypertensive mice have impaired short-term memory and this is prevented by EPL. Nest building encompasses an important behavior and decreased nest test scores have been shown to be associated with cognitive dysfunction. Hypertensive mice had decreased nesting scores, this appears to be mediated by MR signaling because EPL treatment improved the scores. Preliminary data in percentage of nestlet shredded and Time-to-Integrate to Nest Test (TINT) reveal the same effect. We also expect an increase in macrophage density as well as oxidative stress with hypertension. Our results suggest that hypertension causes impaired vasodilation in the PAs and this is associated with neuroinflammation which can lead to cognitive dysfunction.

OPTIMIZATION OF KYNURENINE PATHWAY METABOLITE DERIVATIZATION FOR GAS CHROMATOGRAPHY - ELECTRON CAPTURE NEGATIVE IONIZATION - MASS SPECTROMETRY (GC - ECNI - MS)
Michael Zeiler (Michigan State University)
Category & Time: Biochemistry and Molecular Biology, Section 12, 2:30 PM - 3:45 PM
Poster: 120
Mentor(s): Scott Smith (Research Technology Support Facility)

Kynurenine and related metabolites have long been thought to play a role in mental illnesses such as depression and schizophrenia. Current hypotheses propose that an imbalance of certain metabolites in the Kynurenine Pathway is one cause of mental illness. This research explored a new Gas Chromatography – Mass Spectrometry methodology that can sensitively, accurately, and precisely quantify the concentrations of specific metabolites of interest of the Kynurenine Pathway. The method involves derivatization of the metabolites by pentafluorobenzyl bromide (PFBBr) followed by analysis by GC - ECNI-MS. Analysis of the samples was performed on a Thermo Trace GC Ultra/DSQII GC-MS system using a nonpolar column. Derivatization by PFBBr is common for polar molecules such as carboxylic acids, making them more volatile and hence easier to analyze by GC-MS. The motive for developing this method was mainly to overcome the cumbersome nature of a method currently employed, which esterifies the analytes to their hexaflouroisopropyl esters in a process that is time, labor and financially costly. Also, analysis in the past has been split between GC-MS and LC-MS, adding extra steps. This new method that uses fewer steps, requires analysis only by GC-MS, which means a simplified and higher-throughput flow of research.

BIOSYSTEMS AND AGRICULTURAL ENGINEERING

EFFECT OF ANTIMICROBIAL NANOPARTICLES ON SIZE AND GROWTH RATE OF BACTERIA
Fras Baasher (University of Wisconsin-Madison)
Category & Time: Biosystems and Agricultural Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 125
Mentor(s): Evangelyn Alocilja (Biosystems & Agricultural Engineering)

As we head into the future, microorganisms are developing antibiotic resistance. Laboratories and hospitals are running out of usable antibiotics and an alternative is needed. Some nanoparticles have been shown to possess antimicrobial properties. In this study, twelve nanoparticles were tested against several microorganisms, such as E. coli C3000, M. smegmatis, and B. cereus. First, the zone of inhibition of each nanoparticle was tested against each microorganism. For nanoparticles that affected the growth of microorganisms, several concentrations were used to find the concentration required to inhibit the growth on an agar plate. Results from those experiments suggest that some of the nanoparticles tested could potentially be used as alternative antibiotics.

PCR-LESS DNA DETECTION USING FUNCTIONALIZED GOLD NANOPARTICLES
Tess Cannon (Michigan State University), Rebecca Jones (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 126
Mentor(s): Evangelyn Alocilja (Biosystems & Agricultural Engineering)

Human pathogenic diseases are often difficult to isolate, diagnose, and treat, especially where the technology for diagnosis, such as microscopy and PCR, is not available. Current methods of disease diagnostics often involve long assay time and low specificity, leading to improper disease management. 1.4 million people die each year from tuberculosis alone, which does not have a simple diagnostic method. Previously, DNA-nanosensors have enabled rapid optical detection of human pathogens. We developed an optical method using functionalized gold nanoparticles (AuNPs) to sense DNA from Escherichia coli and Mycobacterium tuberculosis. The detection process involves combining the functionalized AuNPs with an aminated probe complementary to a specific gene of the target pathogen and a sample that may contain pathogenic DNA. The sample is heated to denature any DNA and allow hybridization of the probe. This is followed by the addition of hydrochloric acid. The amino group on the probe can interact with the functional group, attaching the probe to the AuNPs. However, if DNA is present, the probe hybridizes with the DNA and causes aggregation of the gold nanoparticles, producing a purple color. If target DNA is not present, the red color of AuNPs remains. This colorimetric detection method is optimal for use in developing countries and in rural areas because it is simple, rapid, cost effective, and does not require expensive equipment. With further optimization, application to other pathogens is expected.

QUINOA PHENOLIC CONTENT AND ANTIOXIDANT ACITIVITY
Yu-Shuo Chen (Michigan States University)
Category & Time: Biosystems and Agricultural Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 127
Mentor(s): Ilce Gabriela Medina Meza (Biosystems & Agricultural Engineering)

Quinoa, Which is called pseudo cereal, has been known for its nutritional value and potential health benefits. The experiment identified the total phenolic content and the antioxidant activates of 28 different Quinoa cultivated from the lab of Washington University. The experiment result will compare with the commercial product of Quinoa. The extract was obtained from the sample, and react with the reagent in order to used UV-Vis to know the absorbance compare with the methanol as the blank. The result will be based on the Garlic Acid standard curve to determine its phenolic content. Lots of research showed, most of the ant oxidative potential of plant foods could be beneficial to human health, is due to the properties of phenolic compounds. At the epidemiological level, plant polyphenols have been suggested to reduce the risk of cardiovascular diseases (food and chemical toxicology).Finding of these phenolic, add new knowledge to the functional components of quinoa seeds of different cultivar background.

AN ENERGY-NEUTRAL BIOMASS PRETREATMENT SYSTEM TO PREPARE AMENDABLE HYDROLYSATE FOR CELLULOSIC BIOREFINING
Henry Frost (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 128
Mentor(s): Wei Liao (Biosystems & Agricultural Engineering)

The United States produced a total of 534 million tons of agricultural residues annually, which represents 41% of the biomass needed to replace 30% of gas consumption by 2030. Despite this, little of the agricultural biomass is used for fuel and chemical production. The barriers hindering their use are feedstock handling and conversion. Agricultural biomass and residues contain significant quantities of variable non-pristine compounds, necessitating feedstock-specific handling methods and causing logistical and transportation difficulties. The recalcitrant structure of these materials requires energy and chemical-intensive pretreatment processes to release mono-sugars, raising process efficiency and environmental concerns. New technologies are needed to address these issues and to enable efficient biomass handling and environmentally friendly conversion for next-generation bio-based fuel and chemical production. The purpose of this study is to develop an energy-neutral feedstock handling process that treats lignocellulosic feedstocks, eliminates the chemical intensive pretreatment and creates a readily hydrolysable material for integrated biorefining. Research has determined that a modified anaerobic digestion can treat lignocellulosic feedstocks to reduce the particle size and impregnate cellulose solids with water. The next step is to use ball milling to generate a cellulose and hemicellulose slurry for enzymatic conversion of sugars. Using the ball mill's many parameters an optimum operating condition will be determined. Therefore, the anticipated outcome of this study is that using a ball mill in sequence with anaerobic digestion will create a high-efficiency, energy positive and chemical free feedstock handling process, which will make a major contribution to sustainable integrated biorefineries.

CONVERTING PHENYLALANINE TO LIGNIN USING ARABIDOPSIS THALIANA (T87) CELLS
Patrick Gentles (Medgar Evers College CUNY)
Category & Time: Biosystems and Agricultural Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 129
Mentor(s): Christopher Saffron (Biosystems & Agricultural Engineering), Zhongyu Zhang (Biosystems & Agricultural Engineering), Le Wu (Biosystems & Agricultural Engineering), James E. Jackson (Chemistry), Yair Shachar-Hill (Plant Biology)

Global warming is a major worldwide concern because of CO2 emissions to the atmosphere from combusting fossil fuels. One way we aim to reduce CO2 emissions in the atmosphere is by producing renewable energy and converting plants to fuels by means of producing eco-friendly energy sources. There are three major components in the plant cell wall: lignin, cellulose and hemicellulose. Lignin, an important organic polymer that is found in the cell walls of vascular plants, is a major precursor of aromatics that are present in pyrolysis bio-oils.

Lignin is primarily formed from the amino acid phenylalanine. Hypothetically, Arabidopsis thaliana (T87) cells, grown in liquid culture, can uptake phenylalanine and convert it into cell wall material. If successfully consumed, then phenylalanine will become the precursor to lignin that is deposited as cell wall polymer. Completion of this experiment is critical for making cell lines for use in mapping the reaction pathways of pyrolysis and catalytic pyrolysis using 13C-labelled T87 cells as probes at different temperatures. Understanding the reaction pathways leading to bio-oil's unique composition will be very essential for selecting plants with traits that are advantageous to pyrolysis. Additionally, it will be useful in identifying and solving challenges that are related to the further refinement of bio-oil into liquid fuels. This research is important because it will enable us to have an in-depth understanding of bio-oil composition and resolve problems that are faced with purification of bio-oil. These newly found resolutions will assist in reducing CO2 emissions in the atmosphere.

CHESTNUT HARVESTER MODIFICATIONS AND IMPROVEMENTS
Steven Hogan (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 130
Mentor(s): Daniel Guyer (Biosystems & Agricultural Engineering)

Various mechanical modifications and improvements to a prototype chestnut harvester system are needed as part of a research project to assist the expanding Michigan chestnut industry. This system was designed to target chestnut farmers who own enough land that hand harvesting is too inefficient, yet they cannot afford a commercially available mechanical harvester. The concept harvester system consists of a single-stage combined vacuum and separation system involving minimal mechanical parts. After traveling up the entrance hose, the chestnuts and debris enters a container that has a series of metal fins angled toward the vacuum. Lighter debris bounce on the top of the fins and continue toward the fan powering the vacuum action, where they are shredded without consequence. Heavier chestnuts fall through the gaps between fins, effectively sorting them from the undesirable material. Modifications under this project consist of: 1) adding the ability to individually and easily adjust the fin angles, 2) adding a declogging mechanism by flipping the fins 90 degrees towards the inlet stream, and 3) modifying the purging mechanism to be more efficient and accessible.

FUTURE OF BIORENEWABLES: BIOMASS PRETREATMENT AND CARBON FOAMS
Leonardo LaCivita (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 131
Mentor(s): Mikhail Redko (Chemistry)

A key barrier in biorenewable chemical production is the expense of processing equipment for the producer. Cellulosic glucose and ethanol production takes place in three general steps: biomass pretreatment, hydrolysis, and fermentation. The pretreatment step is used to break the crystalline structure of cellulose, and allow for the removal of lignin from the biomass feedstock necessary for efficient hydrolysis. Carbon foam is a largely niche industry, as the current methods of production are complex and produce toxic chemical intermediaries. The benefit of biomass derived carbon foam is the simplification of the current process, and the removal of the toxic intermediaries. The goal of this research is twofold: an economic analysis of biomass pretreatment methods and tensile strength analysis of cellulosic carbon foam preparations. The economic analysis compared the ammonia fiber explosion (AFEX), ammonia recycled percolation (ARP), and novel Modified-ARP process biomass pretreatment methods. Modified-ARP provides the most economically competitive pretreatment method by making both operational and equipment cost cheaper through a proprietary solvent. The result of the economic analysis showed the AFEX to be the most expensive, the ARP was slightly cheaper, and the Modified-ARP was the least expensive. In terms of system design, the AFEX and ARP systems are similar but differentiated by temperature and pressure requirements, making ARP more economical. The Modified-ARP shows even greater profitability because of the removal of the recycling system necessary for ammonia. The result of biomass derived carbon foam show increasing tensile strength, and improving uniformity of structure.

EVALUATION OF VARIABLES THAT AFFECT THE DESIGN OF A SUBSURFACE DRAINAGE SYSTEM.
Sam Lake (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 134
Mentor(s): Ehsan Ghane (Biosystems & Agricultural Engineering)

Materials used for the design of a subsurface drainage system that effectively manage the water table on agricultural land were evaluated to determine the most cost effective option. A drainage system for a corn and soybean farm in Laingsburg, MI is designed to prevent soil from being oversaturated and potentially drowning the roots while minimizing the necessary amount of tubing in order to reduce costs. Mostly the effective radius, or radius of an ideal drain, the saturated hydraulic conductivity of the soil and the depth to the impermeable layer effect the parameters of drain spacing and drain depth. For this experiment the saturated hydraulic conductivity and depth to impermeable layer was determined by producing a custom soil report from Web Soil Science. To calculate effective radius, the perforations for single wall corrugated plastic tubing were measured and these values were used to determine perforation area. Using an empirical relationship determined from previous research used to determine the effects of perforation area on effective radius (Mohammad and Skaggs 1983), the effective radius for corrugated tubing from various manufacturers was determined. Using the Hooghoudt Equation, the drain spacing could be found by estimating the effective depth and using a reiterative process to converge on a solution. Location of lateral drains is decided by generating a contour map for the site and strategically designing the system to allow gravity flow to occur by placing drains on contours.

ON SIMULATING SYNAPTIC COMMUNICATION IN NEURONAL CLUSTERS
Richard Noriega (Beloit College)
Category & Time: Biosystems and Agricultural Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 135
Mentor(s): Mark Reimers (Neuroscience)

The complex operations of the brain are poorly understood, particularly the mechanics of learning and memory. New optical imaging technologies are enabling neuroscientists to observe firing patterns of thousands of neurons in a local network of the brain. Often a complex cluster structure is observed in these experiments; such clusters are composed of many neurons firing signals in a correlated pattern. These firing patterns reflect subtle higher-order structure in synaptic connection weights. However current neural computational models do not predict such clustering. Synaptic weights are thought to depend on firing patterns through some forms of neuroplasticity. Neuroplasticity, the change of neurons' connections and their synaptic strength, or weights over time, has been observed from the increased neuronal response strength in the connections to previous neuronal firing, per Hebb's learning rule. We will investigate two things through computational models: 1) Whether recent studies on higher-order structure of connections provide sufficient information to simulate neuronal clustering. We will explore this by generating random networks in a novel way: with the kind of higher-order dependence structure in synaptic weights. 2) Whether Hebbian learning applied to independently connected neurons is enough to reproduce clustering patterns of multiple neurons. We analyze this by inputting random connections and synaptic weights, and in a novel way, constructing a set of random networks with a dependence on their weights. We expect the simulations to form correlated groups of firing neurons from independent ones, and strengthen or weaken connections over time.

THE EFFECTS OF CONDUCTIVE PARTICLES ON ANAEROBIC DIGESTION OF AQUEOUS BIOOIL
Nate Olson (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 136
Mentor(s): Wei Liao (Agricultural & Biosystems Engineering), Sibel Uludag-Demire (Agricultural & Biosystems Engineering)

Anaerobic digestion has been shown to be an effective method to treat organic wastes with the benefit of reducing their environmental impact and producing alternative energy in the form of methane. Many studies in recent years have been done on microbial communities to improve the digestion efficiency and enable the digestion to handle multiple feedstocks. This study seeks to develop a robust digestion process to utilize a waste stream from pyrolysis of lignocellulosic biomass – aqueous biooil (wastewater after washing biooil). Phenolic compounds in the aqueous biooil present a problem to anaerobic digestion because they are inhibitory to the digestion process. This study uses activated carbon and biochar as additives in an attempt to increase the electron transfer between microbes and enhance their capability to tolerate the inhibitory effect of phenolic compounds. Multiple reactors were set up and fed with differing amounts of biooil and catalyst. The hydraulic retention time (HRT) of the reactors in this study was set to 20 days. Several measurements were taken to determine the effectiveness of each reactor set up including daily biogas measurements, weekly total solids (TS) and volatile solids (VS) tests, and microbial community analysis.

EFFECT OF TART CHERRY FLAVONOIDS ON LIPOSOMAL OXIDATION
Matthew Schweiss (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 137
Mentor(s): Carlo Barnaba (Biophysics), Ilce Gabriela Medina Meza (Biosystems & Agricultural Engineering)

Cholesterol oxidation has been shown to cause a variety of health problems including chronic diseases such as atherosclerosis and Alzheimer's disease, colon and prostate cancers, as well as eye diseases such as cataracts and age-onset macular degeneration. Decreased amounts of cholesterol oxidative products (COPs) in the body could pose significant health benefits. The goal of this project is to evaluate the effects tart cherry (Prunus cerasus L.) flavonoids have against cholesterol oxidation using large unilamellar vesicles (LUVs). Tart cherries are known to have antioxidant properties and could be very effective against cholesterol oxidation. LUVs will be prepared using cholesteryl stearate or cholesterol and POPC or DMPC. Liposomes will be extruded through a polycarbonate membrane to give them a size of around 100 nanometers. Whole cherry extracts and specific anthocyanins found in cherries will be used to test the effectiveness of cherries on AAPH induced lipid oxidation. Different concentrations of extract and anthocyanins will be added to determine which concentration is most effective against lipid oxidation. To quantify the number of lipid peroxides generated in the liposomes, peroxide value assay for primary oxidative products, TBARS assay for secondary oxidative products and gas chromatography for profiling and quantification of specific oxidative products will be used.

LABORATORY COLUMN STUDY ON THE VERTICAL MOVEMENT OF ORGANIC AND INORGANIC PHOSPHORUS-BASED FERTILIZERS IN MICHIGAN'S SOIL
Thiramet Sotthiyapai (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 138
Mentor(s): Steven Safferman (Biosystems & Agricultural Engineering), Jason Smith (Biosystems & Agricultural Engineering)

Eutrophication is caused by the runoff of nitrogen (N) and phosphorus (P), which are used as fertilizer. Excess amounts of these nutrients in the environment can damage the quality of water, economy, and disturb the freshwater ecological structure and function. In addition, there are potential risks when a significant amount of subsurface P and N leakage reaches groundwater. A laboratory column study was conducted to determine the vertical movement of P-based nutrients from organic and inorganic fertilizers. Ultimately, statistical analysis will be done to compare significant differences between effluent from columns within and between organic and chemical fertilizer groups.

Michigan's summer weather and typical soil properties were set as standard conditions for every column. Organic and chemical sources of P were investigated through surface application to the columns. Sources of organic fertilizers were dairy, swine, and poultry manures. The chemical fertilizers investigated were mono ammonium phosphate, di-ammonium phosphate, and triple superphosphate. Rain events were simulated at a frequency of 7–35 days at 2.54 cm h-1, in accordance with Michigan annual rainfall data. Subsurface effluent from each column will be collected and then tested with HAHC test kits and a 6000 spectrophotometer for soluble phosphorus, total phosphorus, and nitrogen. Results are still being collected.

DESIGN AND CONSTRUCTION OF A PILOT ANAEROBIC DIGESTER FOR HIGH SCHOOL SCIENCE PROGRAMS
Ethan VanAntwerp (Michigan State University)
Category & Time: Biosystems and Agricultural Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 139
Mentor(s): Dana Kirk (Biosystems & Agricultural Engineering)

Use of hands-on examples of anaerobic digestion has not been prevalent in high school education. This pilot-scale anaerobic digestion project was designed to facilitate classroom learning of bio-energy. Several objectives and constraints were considered during the design process. Ease of construction was considered in the design to aid in the construction by laypersons. The digester was designed with consideration of the $1,000 funding provided and the financial means of the end user. Limiting the digester to 20 liters kept the project within budget and allows for an appropriate classroom-scale project. For mixing, a lab impeller will attach to a 12 volt 56 rpm DC motor. A 120-volt outlet timer is used to set mixing times for the impeller. The digester is heated using 2 heating pads. These pads are then controlled using an Inkbird temperature control unit. Insulation was added to the outside of digester to help improve efficiency. The assembled digester is placed on top of a scale to measure the weight of waste being put in and drawn out. Measurement of the gas was designed to be read with a manometer made from PVC. The carboy was tested for its ability to hold pressure by attaching a 1-15 psi pressure gauge to the vessel and pressurized to psi of 2.4. The pressure did not drop below 2 psi over 6 days. Upon completion of the design and construction phase, next steps will include development of standard operating procedure and testing in 3 high schools to receive user feedback.

ELECTROCATALYTIC HYDROGENATION OF LIGNIN DERIVED COMPOUNDS WITH ELECTROCHEMICALLY REDUCED RUTHENIUM ON ACTIVATED CARBON CLOTH
Zack Wofford (University of Arkansas)
Category & Time: Biosystems and Agricultural Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 140
Mentor(s): Mahlet Garedew (Biosystems & Agricultural Engineering)

The fossil fuel industry is inherently unsustainable; the resources are finite and their combustion is detrimental to the environment. Consequently, alternative sources of energy-dense liquid fuels are being explored. Currently, bio-oil produced through fast pyrolysis of biomass is being examined for its potential to displace petroleum. However, crude bio-oil is highly reactive and corrosive. Furthermore, bio-oil has lower energy content compared to petroleum. Electrocatalytic hydrogenation of pyrolyzed lignin-derived compounds has shown to be a means of upgrading bio-oil to more stable forms aiding in the storage and transport of a product with increased value and energy density. Previous study has shown that ruthenium on activated carbon cloth (Ru/ACC) is effective in upgrading lignin-derived bio-oil compounds such as guaiacol. An alternative method of catalyst preparation has been developed through employment of electrochemical reduction rather than conventional reduction of ruthenium on carbon cloth using a high temperature and pressure Parr reactor. The current study examines the effectiveness of electrochemically reduced ruthenium on activated carbon cloth (EC-Ru/ACC) under mild conditions seeking in particular to optimize percent ruthenium loading, current efficiency, catalyst reusability, and the effectiveness of the catalyst on various dimers and monomers while attempting to maintain minimal leaching of ruthenium. In an ideal, applied setting, EC-Ru/ACC would upgrade bio-oil produced at a decentralized pyrolysis depot using renewable energy. The upgraded, stable, and energy dense bio-oil would then be transported to a centralized hydrotreatment facility to produce hydrocarbon fuels and value-added products.

CELL BIOLOGY, GENETICS AND GENOMICS

THE EXPRESSION LEVEL OF MULTIDRUG RESISTANCE- ASSOCIATED PROTEIN AND GLUTATHIONE PRECURSOR DURING METHYLMERCURY EXPOSURE
Sarangelica Alamo Ortiz (University of Puerto Rico at Humacao)
Category & Time: Cell Biology, Genetics and Genomics, Section 1, 1:00 PM - 2:15 PM
Poster: 143
Mentor(s): Duanghathai Wiwatrana (Pharmacology & Toxicology)

In the central nervous system (CNS), astrocytes are the first cells exposed to methylmercury (MeHg) and accumulate mercury more than neurons. However, neurons are more susceptible to MeHg than astrocytes. Astrocytes play an important role in neuronal protection by supplying antioxidant glutathione (GSH) to neurons. GSH is necessary to neurons especially during oxidative stress. MeHg behaves as an electrophile which causes oxidative stress in neurons and astrocytes. GSH, as well as MeHg, are transported through the multidrug resistance-associated protein (Mrp) from astrocytes. We hypothesized that during MeHg insult in the CNS, astrocytes attempt to produce more GSH and up-regulated Mrp in order to excrete MeHg. GSH production from astrocytes is, however, insufficient to supply neurons. Therefore, neuronal degeneration occurs. In this study, spinal cord astrocytes were exposed to 0.5μM MeHg for 30 min, 1h and 3h. The expression of Mrp1 and GSH precursor, a Glutamate cysteine ligase catalytic subunit (Gclc) mRNAs were determined using quantitative polymerase chain reaction. The Gclc mRNA was increased 2 fold at 30 min and was further increased 2.4 fold at 1 h of MeHg exposure.

Later at 3 h of MeHg exposure, Gclc mRNA declined into 1.3 fold. The Mrp1 mRNA expression was down regulated for all time points. This study suggested astrocytes attempted to induce the production of GSH to defend against oxidative stress and reduce the export of GSH by reducing the Mrp expression. Therefore, the insufficient GSH supply by astrocytes could contribute to neuronal death during MeHg exposure.

DENDRITIC SPINE ANALYSIS OF STRIATAL SPINY PROJECTION NEURONS IN THE MOUSE MODEL OF FRAGILE X SYNDROME

David Battle (Tennessee State University), Thomas O'Malley (Michigan State University)

Category & Time: Cell Biology, Genetics and Genomics, Section 1, 1:00 PM - 2:15 PM
Poster: 144
Mentor(s): Joseph Beatty (Physiology), Charles Cox (Physiology), Bronson Gregory (Physiology)

Fragile X syndrome (FXS) is the most common form of inherited intellectual disability and the leading genetic cause of autism spectrum disorder. Symptoms include hyperactivity, social phobia, impaired cognition, and repetitive/compulsive behaviors. FXS is caused by a repeating CGG mutation in the FMR1 gene leading to a decrease in fragile X mental retardation protein (FMRP). FMRP is highly expressed in neurons, especially in dendritic spines, the primary site of synaptic connections. Neocortical neurons from FXS patients and Fmr1 knock-out (KO) mice have an increased density of abnormally elongated dendritic spines, suggesting that the decrease of FMRP is linked to abnormal spine development, leading to alterations in synaptic transmission. The striatum is the input nucleus of the basal ganglia, a group of subcortical brain regions implicated in voluntary motor control and learning. Although basal ganglia dysfunction has been linked to repetitive/compulsive behaviors, few studies have investigated the spine morphology of striatal spiny projection (SP) neurons in FXS. In this study we performed two-photon laser scanning imaging of fluorescently labeled SP neurons from WT and Fmr1 KO mice (approximately 3 weeks of age). Image series in the z-plane of proximal and distal dendrites from SP neurons were used to count and classify dendritic spines into distinct subtypes based on shape and overall length. We hypothesize that the spine alterations seen in the neocortex of FXS patients and Fmr1 KO mice extends to the SP of the striatum and this morphological change can lead to alterations in synaptic transmission.

UNDERSTANDING A NOVEL STRESS-RESPONSE PROTEASE IN ARABIDOPSIS

Andrea Bostrom (Bryan College)

Category & Time: Cell Biology, Genetics and Genomics, Section 1, 1:00 PM - 2:15 PM
Poster: 145
Mentor(s): Jianping Hu (Plant Biology), Stefanie Tietz (Plant Biology)

One of the most prominent challenges in agriculture today is increasing the stress-resistance of plants to more extreme environmental challenges (e.g. drought, heat). One organelle involved in plant stress response is the peroxisome, a small, single-membrane bound organelle found in all eukaryotes. Our research focuses on how mutations in a novel peroxisomal protease called "Response to Drought 21A-like Cysteine Protease 1" (RDL1) affect stress responses in *Arabidopsis*. There are two T-DNA mutants of RDL1, rdl1-1 and rdl1-2, a knockdown and a knockout, respectively, which have been shown to impact beta-oxidation, germination rate after storage, and response to low CO_2 stress. To further characterize stress responses, rdl1-1 and rdl1-2 will be subjected to three treatments: high light shock and drought shock after 3 weeks under normal growth, and continuous high light from germination. We will then observe the early senescence phenotype, seed yield, and photosynthetic parameters of each treatment. We anticipate that the knockout mutation, rdl1-2, will show decreased resistance to both light and drought stress. Dynamic Environmental Photosynthetic Imaging (DEPI) will be used to measure the relationship between photosynthesis and the early senescent phenotype in this novel protease RDL1. RDL1 is not known to have a role in photosynthesis or photorespiration, so a phenotype would suggest a new function for RDL1. Further research will include repeating these stress treatments using an RDL1 overexpressor. Ultimately, better understanding the role of RDL1 in *Arabidopsis* stress response may help create a model for agricultural stress-resistance experiments

THE EFFECT OF 5-HYDROXYTRYPTAMINE (SEROTONIN) ON TIGHT-JUNCTION FORMATION AND BARRIER PERMEABILITY IN BBE CELL MONOLAYERS

Rebecca Cena (Michigan State University)

Category & Time: Cell Biology, Genetics and Genomics, Section 1, 1:00 PM - 2:15 PM
Poster: 146
Mentor(s): Mark Kadrofske (Pediatrics and Human Development)

Background: Epithelial barrier integrity is important to prevent inflammation in intestinal tract. Tight junctions (TJ) between intestinal epithelial cells regulate passage of gut luminal contents and are key components of intestinal barrier integrity. Regulation of TJ function and expression is only partly understood. 5-Hydroxytryptamine (5-HT, serotonin) is a pro-inflammatory paracrine-signaling molecule in the intestine, which might regulate TJ function/expression. Hypothesis: 5-HT will increase barrier permeability by altering formation of tight junctions. Methods: Caco-2 brush-border epithelial (BBE)-cells were seeded and grown onto Transwell 0.4-micron permeable inserts. To determine TJ function, transepithelial electrical resistance (TEER, ohms/cm-2) was measured using an EVOM^2 Epithelial Voltohmmeter. To determine TJ formation, BBE cells were grown on glass-coverslips to confluence, fixed, and stained with anti-zona-occudins-1 (ZO-1) antibody. TEER and ZO-1 staining was determined in the absence and presence of 5-HT. Results: TEER increased from 100-to-800 ohms/cm-2 during the first 12-days after seeding and stabilized at this resistance, indicating formation of a stable barrier. We then examined the effect of 5-HT on the function of this barrier. Cells were stained for ZO-1 to identify TJ formation, and are currently under analysis. Conclusion: This work assists in understanding mechanisms of regulating epithelial barrier integrity in intestine and the role of 5-HT in this process. This could present new therapeutic interventions of inflammatory disorders, which result in a breakdown of intestinal epithelial barrier integrity. Support: Rebecca Cena is a REPID scholar supported by NIH-5-R25-HL108864-award to E.C., and M.K.

DISCOVERING NOVEL SUBSTRATES OF THE COP9 SIGNALOSOME
Selena Cholak (University of Detroit Mercy), Matthew Lupsan (University of Detroit Mercy)
Category & Time: Cell Biology, Genetics and Genomics, Section 1, 1:00 PM - 2:15 PM
Poster: 147
Mentor(s): Nicole Najor (Biology)

The desmosome, a cell junction protein complex, functions by interacting extracellularly and intracellularly. The desmosome communicates extracellularly with desmosomes of nearby cells and links intracellularly to intermediate filament cytoskeleton, thereby connecting cells through a cytoskeletal network. Desmosomes are in various epitheliums and are significant as mutations in the genes that code for desmosome proteins can cause a variety of diseases, such as debilitating skin disorders. COP9 signalosome (CSN) is a structurally conserved multiprotein complex classically known to remove Nedd8 protein modifications from cullin ubiquitin ligases. The CSN was found to interact with the desmosome, of which the interaction was required for proper epidermal stratification through regulating the neddylation of a novel substrate, the Epidermal Growth Factor Receptor. Our goal is to identify other novel substrates of the CSN using the budding yeast model, S. cerevisiae. To this end we will exploit previous synthetic lethality research in S. cerevisiae, which provides us with a list of putative CSN targets. This presentation will focus on the future research plans to determine novel CSN targets through a variety of methods including SDS-PAGE Western blotting, immunofluorescence techniques, and immunoprecipitations, which will reveal potentially new regulatory mechanisms of the CSN.

USE OF NEW HIGH THROUGHPUT PHENOTYPING AND ANALYTICS PLATFORM TO UNDERSTAND THE GENETIC AND FUNCTIONAL BASES OF COLD INHIBITION OF PHOTOSYNTHESIS IN COWPEA
Anna Cowie (Westminster College)
Category & Time: Cell Biology, Genetics and Genomics, Section 1, 1:00 PM - 2:15 PM
Poster: 148
Mentor(s): Donghee Hoh (Cell & Molecular Biology)

Climate change, loss of arable land and increased populations require improvements in food crop efficiency and robustness. Cowpea (Vigna unguiculata (L.) Walp.) is an annual legume that serves as a staple crop for resource poor farmers in developing countries due to its high protein content, resistance to drought and low soil fertility, and its ability to fix atmospheric nitrogen. Cowpea yield is highly sensitive to both high and low temperatures, greatly restricting the regions and growing times. Our preliminary work suggests that photosynthesis may be involved in both of these stresses. The goal of this project is to identify genes and mechanisms related to tolerance to moderately low temperatures. We studied photosynthetic and growth responses to low day and night temperatures in 66 recombinant inbred lines (RILs) from parents selected for differential cold sensitivity. We used two, complementary phenotyping systems, the Dynamic Environmental Phenotyping Imager (DEPI) and the field-portable PhotosynQ, designed to bridge the gaps between the lab and field. We determined there was considerable natural variation that can be used for quantitative trait locus (QTL) mapping and breeding efforts. Most interestingly, cold sensitivity in the cowpea strongly correlated with a loss of the photoprotective qE response and increased photoinhibition or photodamage of the photosynthetic apparatus, suggesting sensitivity mechanisms involving the machinery that generates and dissipates the thylakoid proton motive force.

INVESTIGATING THE DISTRIBUTION AND DIVERSITY OF BACTERIAL ACC-D TO PROMOTE PLANT GROWTH DURING ABIOTIC STRESS
Jamell Dacon (CUNY Medgar Evers College)
Category & Time: Cell Biology, Genetics, & Genomics, Section 1, 1:00 PM - 2:15 PM
Poster: 149
Mentor(s): Patrick Kearns (Microbiology & Molecular Genetics), Ashley Shade (Microbiology & Molecular Genetics)

The growth of the human population and changes in global environmental conditions compromises food security. Thus, improving the ability of agricultural crops to resist environmental stress and withstand a changing environment is an important objective that will help to overcome challenges in food security. When plants experience environmental stressors, they induce tissue degradation/degeneration through the release of stress hormones such as ethylene. However, plant ethylene levels can be decreased by plant growth-promoting bacteria that produce the enzyme 1-aminocyclopropane-1-carboxylatedeaminase (ACC-d). As a result, ACC-d can facilitate plant growth and development despite the stressor. Our objective is to understand the distribution and diversity of ACC-d genes across different habitats and among microbial lineages, which will provide insights into the breadth and specificity of the relationships between microbes that produce ACC-d and plants. In our approach, we mined shotgun metagenomes from a wide variety of habitats, including marine systems, compost, freshwater, soils, and mammal guts. We found that ACC-d is widespread in many environments but that the greatest diversity and abundance was observed in soil environments. This suggests that bacterial populations that have potential interactions with terrestrial plants are enriched for ACC-d. Thus, there is promise in bioprospecting for effective plant growth promoting bacteria among uncultivated lineages of soil bacteria. The results of this work will improve ecological understanding of microbe-plant interactions during stress, and ultimately contribute insights into leveraging microbe-plants relationships to increase crop production.

THE ROLE OF RAC1 MUTATIONS IN MELANOMA METASTASIS
William Davie (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 2, 1:00 PM - 2:15 PM
Poster: 152
Mentor(s): Kathleen Gallo (Physiology), Sean Misek (Physiology)

Melanoma has the highest mutation frequency of any cancer type, and accounts for approximately 10,000 deaths annually in the US. Developing a better understanding of the mutations that contribute to melanoma metastasis will allow us to develop therapies stop the spread of melanoma and decrease mortality. The 3rd most common coding alteration in melanoma is the $Rac1^{P29S/L}$ mutation. Our preliminary data demonstrate that overexpression of $Rac1^{P29S}$ promotes the migration of melanoma cells. The goal of this project is to characterize the role of $Rac1^{P29S}$ in melanoma metastasis using CRISPR/Cas9. This project will also identify oncogenic signaling pathways downstream of $Rac1^{P29S}$ which are required for Rac1-induced migration. These pathways are potential therapeutic targets to treat Rac1-mutant cancers. To accomplish this, Rac1 will be knocked-down utilizing CRISPR within 3 different melanoma cells lines with $Rac1^{P29S}$ mutations. Then, immunoblotting will be used to verify the Rac1 knockout as well as to study the signaling pathways that require Rac1. 3D collagen invasion assays will be used to test the effect of Rac1 knockout on the 3D invasion of melanoma cells. Since MLK3 is an established Rac1 effector, we will also test whether the MLK inhibitor blocks the 3D invasion of Rac1-mutant melanoma cells. Analogous experiments will be performed to measure the activity of key oncogenic signaling pathways altered by Rac1 knockout or CEP-1347 treatment. It is expected that these studies will reveal the effects of mutant $Rac1^{P29S}$ on melanoma cell invasion and help us to better understand the Rac1 signaling pathways in melanoma.

USING FEATURE SELECTION AND MACHINE LEARNING TO FIND CIS-REGULATORY ELEMENTS IMPORTANT FOR RESPONSE TO COMBINED STRESS IN ARABIDOPSIS
Michael Douglas (Adrian College)
Category & Time: Cell Biology, Genetics and Genomics, Section 2, 1:00 PM - 2:15 PM
Poster: 153
Mentor(s): Christina Azodi (Plant Biology), Nicholas Panchy (Plant Biology)

Plants encounter many different stresses such as heat, drought and flooding, and respond by up or down regulating the expression of genes involved in stress acclimation. Under combinations of stresses, plants may display gene expression patterns that are highly unpredictable and synergistic in nature. In this study, machine learning approaches were used to find cis-regulatory elements that are of importance for regulating gene expression. Gene expression levels were measured in plants exposed to heat and drought stress in combination. Then, genes were classified into response groups based on their pattern of differential gene expression under single and combined stresses. Random forest machine learning algorithms were built to predict whether a gene is in a response group or not. My first goal was to determine the usefulness of feature selection in predicting gene expression. In order to determine usefulness, the full set of features were compared to shortened data sets containing the 50 best features selected using three different algorithms. Models built using all and subsets of the features performed better than random models, with AUCROC scores ranging from ~0.7-0.85. The model using only the 50 best features performed as well as the full data sets, implying the existence of key features. The second goal of my project will be to determine if integrating information about sequence conservation, chromatin accessibility, and histone marks will improve model performance. Increased understanding of how expression is regulated under combined stress could lead to development of crops better suited for a changing climate.

EXPRESSION PATTERN OBSERVATION OF CG6191 IN DROSOPHILA MELANOGASTER AND THE LINK BETWEEN ITS HOMOLOG CABLES1 PROTEIN AND EPITHELIAL BASED CANCERS IN HUMANS
Amber Elinsky (University of Detroit Mercy), Isabel Aklestad (University of Detroit Mercy)
Category & Time: Cell Biology, Genetics and Genomics, Section 2, 1:00 PM - 2:15 PM
Poster: 154
Mentor(s): Stephanie Conant (Biology), Jacob Kagey (Biology)

The mammalian protein Cables1 has been shown to be down regulated and frequently mutated in various forms of cancers including ovarian cancer. Investigating the gene CG6191/Mary Shelly (MS) in Drosophila melanogaster (fruit fly) can be used to study the effects of altering the MS gene expression with targeted RNAi. RNAi disruptions have produced phenotypic changes in the wings but have minimal to no alterations in the eyes of the fruit flies. Expression pattern of MS has been observed using the Green Fluorescent Protein (GFP) introduced to the fly's genome through the MiMIC fly lines. In cell culture, the Cables1 protein has been observed in several mammalian cell types, both epithelial tumor cell lines and normal epithelial cell lines, and screened on Western Blots. Implementing SiRNA transfection the link between Cables1 loss of expression and epithelial tumor growth can be observed and implemented into human cancer therapies. Observations based both on Drosophila melanogaster and mammalian epithelial cell lines can provide a functional link between the Cables1 and MS proteins and human epithelial cancers.

USING RESURRECTION PLANTS TO BRING NEW LIFE TO DROUGHT TOLERANCE RESEARCH
Sterling Evans (University of Missouri)
Category & Time: Cell Biology, Genetics and Genomics, Section 2, 1:00 PM - 2:15 PM
Poster: 155
Mentor(s): Robert VanBuren (Horticulture)

Drought is a major contributor to global food loss, and understanding how to combat drought stress is essential for increasing food security under the changing climate. A small group of plants can survive near complete desiccation and these so called 'resurrection plants' could be a viable option to significantly improve drought tolerance in important crop species. We are using a comparative genomics approach with gene expression data from 7 resurrection plants across the plant kingdom to identify desiccation tolerant pathways that are common for all plants. We are also screening candidate desiccation tolerance genes from the model resurrection plant Oropetium thomaeum to study how such genes can confer desiccation tolerance in Escherichia coli. With these combined approaches, we hope to identify a system that would allow us to utilize desiccation pathways from resurrection plants to improve drought tolerance in major crop species.

INVESTIGATING THE GENETIC REGULATION OF TRICOTYLEDONOUS SEEDLINGS
Ashleigh Farmer (Claflin University)
Category & Time: Cell Biology, Genetics and Genomics, Section 2, 1:00 PM - 2:15 PM
Poster: 156
Mentor(s): Brad Day (Plant, Soil, & Microbial Sciences), Miranda Haus (Plant, Soil, & Microbial Sciences)

Canola has catapulted from the sixth to second largest oil crop in the past 40 years and is now the second largest protein meal for feeding of cattle, pigs, and dairy cows. The canola seed contains 45% oil, while 90% of that is found in the cotyledons.Tricotyledonous embryos may reside in larger seeds as they have one cotyledon more than dicots. Arabidopsis thaliana, a close relative of canola, has a population of recombinant inbred lines (RILs) with an increased incidence of tricotyledonous seedlings. We employed the use of this population to ask these questions: (1) Are seeds with tricotyledonous embryos larger than dicotyledonous seeds? (2) Can we increase the incidence of tricotyledonous plants in subsequent generations? (3) Can this phenotype be narrowed down to a particular genomic locus? To achieve this, 180 seeds were plated for each of 211 RILs. Each plate was phenotyped for prevalence of tricotyledonous seedlings and ImageJ was used to measure seed size. Seedlings with the tricot phenotype were then allowed to self-fertilize, and these subsequent seeds replated later in order to observe the prevalence. R/QTL was used to map quantitative trait loci (QTLs) affecting the cotyledon phenotype. Potential candidate genes will be discussed in further detail. Tricot seedlings from larger seeds that successfully demonstrate an increase of prevalence, and can be mapped have the potential to be applied to plants of agricultural importance. In particular, we hope to explore the possibility of increasing oil yield by exploiting the tricotyledonous phenotype.

INVESTIGATING CIRCADIAN CONTROL OF UV-B SENSING IN ARABIDOPSIS THALIANA
Morgan Gaglianese-Woody (Appalachian State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 2, 1:00 PM - 2:15 PM
Poster: 157
Mentor(s): Eva Farre (Plant Biology), Linsey Newton (Plant Biology)

Plants are exposed to daily changing conditions, such as UV-B irradiance. It is therefore critical that plants are able to anticipate changing conditions, so they may respond at the appropriate times of day. Plants respond to changing UV-B exposure through differential expression of genes, and the circadian clock regulates the UV-B signaling response. UV RESISTANCE LOCUS 8 (UVR8) is the photoreceptor that senses UV-B irradiance, and we hypothesize that UVR8 re-dimerization is the target of circadian control. UVR8 exists as a homodimer in the absence of UV-B and monomerizes when it senses UV-B, leading to downstream regulation of genes. REPRESSOR OF UVB PHOTOMORPHOGENESIS genes (rup1, rup2) regulate UVR8 re-dimerization in vivo, allowing the photoreceptor to be recycled. UVR8 protein abundance remains constant throughout the day, yet UV-B signaling response is circadian regulated. Since RUP2 transcription is circadian regulated, repression by RUPs may be the target of circadian control. To determine if RUPs mediate circadian control of UV-B regulated gene expression, I am investigating the expression of the UV-B regulated PRR9::LUC reporter in rup1rup2 and rup2 mutants in Arabidopsis thaliana. If RUPs are involved in circadian control of UV-B signaling, then constitutive induction of PRR9::LUC should be observed in mutant lines after treatment with UV-B. However, if PRR9::LUC induction remains rhythmic in the absence of RUPs, then an alternative pathway is likely the target of circadian control in UV-B sensing.

HISTAMINE RELEASE BY ENTERIC GLIA
Nicole Garcia (University of Puerto Rico at Humacao)
Category & Time: Cell Biology, Genetics and Genomics, Section 2, 1:00 PM - 2:15 PM
Poster: 158
Mentor(s): Brian Gulbransen (Physiology)

Gastrointestinal function is primarily regulated by the enteric nervous system (ENS). The ENS is subdivided into the myenteric plexus and the submucosal plexus and is composed of both enteric neurons and glial cells. In the ENS, histamine serves as an important signaling substance for neuro-immune communication. This messenger is involved in the efficient response of the immune system, active function of the stomach, and it acts as a neurotransmitter in the central nervous system. Additionally, histamine serves as a mediator in visceral pain in Irritable Bowel Syndrome (IBS) diseases, common disorder that affects the large intestine. Conventional theories suggest that histamine is generated primarily by mast cells. However, based in our preliminary data, we expect the main source of histamine release to be glial cells. Glial cells are hormones that act as neurotransmitters, involved in the transfer and storage of information by the nervous system. To test our hypothesis, we will stimulate colonic myenteric plexus preparations with either a TRPV4 agonist, neurokinin-A, ADP and mechanical stimulation in the presence of tetrodotoxin (TTX) which will inhibit action potential generation from enteric neurons and allow us to only

stimulate enteric glial cells. The supernatant from these samples will then be collected and used in an ELISA assay. We will use histamine antibodies to detect the release of the histamine compound in each sample and compare release between samples. These studies will allow us to confirm histamine release from glial cells and help determine which receptor is involved in histamine release.

P2X7 RECEPTOR MEDIATED NEURON LOSS IN THE ENTERIC NERVOUS SYSTEM
Lukas Gaudette (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 3, 1:00 PM - 2:15 PM
Poster: 160
Mentor(s): Ninotchska Delvalle (Neuroscience), Brian Gulbransen (Neuroscience)

Functional gastrointestinal disorders (FGIDs) affect 25 million people in the United States. FGIDs are characterized by persisting and recurring gastrointestinal (GI) symptoms; including diarrhea, constipation, bloating and abdominal pain. These symptoms are in part due to dysfunction in the enteric nervous system (ENS), the division of the autonomic nervous system that regulates GI function. The ENS is subdivided into the submucosal and myenteric plexus and is composed of both enteric neurons and enteric glia. Although the cause of FGIDs is unknown, inflammation has been implicated as a trigger. We have previously demonstrated that inflammation induces neuron death by acting on purinergic pathways and that stimulating glial cells can act on these pathways to drive neuron loss. In this study, we are interested in understanding the mechanisms involved in this neuron loss. We have shown that stimulating neuronal P2X7 receptors in the presence of the L-type voltage gated calcium channel blocker nicardipine, and the muscarinic antagonist scopolamine, was sufficient to induce neuronal loss in the ENS. Here, we are investigating if this P2X7 induced neuron loss is dependent on the presence of nicardipine and/or scopolamine. To this aim, we are using an in situ cell death assay and stimulating myenteric plexus tissue preparations with control buffer or P2X7 agonist in the presence or absence of these antagonists. Neuronal density will be quantified and analyzed using one-way ANOVA. These studies will allow us to understand the mechanisms involved in neuron loss during inflammation and aid in the development of new therapeutics.

GENETIC CHANGES ASSOCIATED WITH VASCULAR REMODELING IN A HYPERTENSIVE PRE-ANEURYSMAL RAT MODEL
Meredith Herman (Michigan State Univeristy)
Category & Time: Cell Biology, Genetics and Genomics, Section 3, 1:00 PM - 2:15 PM
Poster: 161
Mentor(s): Stacie Demel (Neurology & Opthalmology)

Hypertension is a leading risk factor for cerebral aneurysms (CA), which, when ruptured, results in high morbidity and mortality. Current interventions for unruptured CAs are invasive. No known pharmacological interventions prevent further growth or rupture of CAs. Histone deacetylases (HDACs), specifically HDAC-9, have been associated with CAs and vascular remodeling. We hypothesized that we would see vascular remodeling in the basilar artery (BA) in our model and that hypertensive rats with aneurysm-inducing surgery would show an upregulation of HDAC-9 as well as genes associated with inflammation and membrane stability when compared to age-matched controls. 18-week-old male spontaneously hypertensive stroke-prone rats underwent bilateral carotid artery stenosis (BCAS) surgery. Rats were euthanized 8 weeks post-surgery and tissue was collected for molecular and immunohistochemical analysis. RNA was extracted from the BA, SCA, and PCAs and was reverse transcribed. qRT-PCR was used to assess the mRNA expression of 15 genes of interest. Data were analyzed using Student's t-test. Data are shown as a fold change from control (beta-2-microglobulin) ± SEM. Inflammatory markers CD163, tnf-α, and NF$\kappa\beta$, apoptotic markers p53 and tnfr-1, ROS markers iNOS2 and p47phox, MMP markers -2, -9, and -13, and HDAC 1, -7 and -9 were all upregulated compared to controls. Inflammatory marker IL-4, apoptotic marker BCL-2 and ROS marker NOX2 were downregulated compared to controls. HDAC-9 was also upregulated compared to control. Genes in pathways associated with inflammation were upregulated and extracellular matrix stability were downregulated in our rat model of cerebral aneurysms.

IDENTIFYING THE ACTINOBACILLUS SUCCINOGENES GLUCOKINASE GENE
Meghan Grossmann (Michigan State Univeristy)
Category & Time: Cell Biology, Genetics and Genomics, Section 3, 1:00 PM - 2:15 PM
Poster: 162
Mentor(s): Claire Vieille (Microbiology & Molecular Genetics)

Actinobacillus succinogenes is a fermentative bacterium isolated from the cow rumen, and is the best known natural succinate producer. If produced cost-competitively, succinate could replace oil as the feedstock to produce many industrial products. Today the succinate production is not cost effective but with genetic engineering the consumption of one glucose molecule could yield two moles of succinate. How A. succinogenes uptakes glucose to produce succinate is unknown, as this organism does not have a glucose phosphotransferase system. Our working hypothesis is that A. succinogenes uses an ABC transporter (ATP-dependent system) followed by glucose phosphorylation by glucokinase to glucose-6-phosphate, which then enters glycolysis.. No gene annotated as a glucokinase gene is present in the genome sequence, and no sugar kinase genes are upregulated in the transcriptome of glucose-grown cultures. Thus, the goal of my project was to identify what could be a completely new glucokinase gene in Actinobacillus. My approach was to build an Actinobacillus genomic plasmid library of partially digested Sau3A fragments, and use it to complement an Escherichia coli strain devoid of glucokinase for growth on minimum medium-glucose plates. The only colonies growing on these plates will have a plasmid carrying an Actinobacillus glucokinase-encoding gene. By sequencing the plasmid inserts of these colonies, we hope to identify the A. succinogenes glucokinase gene. In the future, we could overexpress this gene to increase glucose uptake and succinate production. This would result in a cheaper succinate production, and succinate replacing oil in the production of goods.

CELLULAR AND TEMPORAL VARIABILITY OF GENE EXPRESSION IN ALZHEIMER'S DISEASE
Kailinn Hairston (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 3, 1:00 PM - 2:15 PM
Poster: 163
Mentor(s): George Mias (Biochemistry & Molecular Biology)

In the United States, around 5 million people are affected by Alzheimer's disease, an irreversible neurodegenerative disease that affects the cognition in the brain and slowly destroys thinking skills and memory. Alzheimer's, along with other types of dementia, will cost the nation approximately $259 billion in 2017. Certain genetic variants have already been associated with Alzheimer's, and may be used as biomarkers for the disease, and estimate disease risk. Beyond identifying genomic variants, we may search for disease biomarkers through assessing gene expression, the levels of RNA transcripts for genes in a cell. We plan to investigate differences in global gene expression in individuals with Alzheimer's disease, compared to healthy cohorts, by curating human gene expression datasets that are publicly available, and re-analyzing them to identify genes associated with Alzheimer's. We have been curating public data from microarray analyses from online databases (Gene Expression Omnibus [GEO] and ArrayExpress), and will conducting statistical analysis using R (in Rstudio). We will first preprocess and normalize the raw microarray data, and then conduct analysis of variance (ANOVA) using linear models. This will allow us to assess variability in gene expression with respect to disease, age, gender, and tissue. We anticipate we will identify differentially expressed genes in Alzheimer's compared to healthy individuals, and will evaluate their membership in molecular pathways. These genes and pathways associated with Alzheimer's can potentially be used to improve our diagnostic abilities and possibly identify gene targets for treatment.

EVALUATION OF THE BROMODOMAIN INHIBITOR I-BET 762 FOR PREVENTION OF LUNG CANCER
Quinn Hanses (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 3, 1:00 PM - 2:15 PM
Poster: 164
Mentor(s): Karen Liby (Pharmacology & Toxicology), Di Zhang (Pharmacology & Toxicology)

Lung cancer continues to be the primary cause of cancer-related deaths across the globe, with 5-year survival rates less than 20%. Because of limited success in reducing these high mortality rates, new drugs and methods are desperately needed. For this reason, cancer prevention has become a promising strategy. The bromodomain inhibitor, I-BET 762, is an example of a new generation of selective drugs that reversibly targets BET (bromodomain and extra-terminal) proteins and impairs their ability to bind to acetylated lysines on histones, thus interrupting downstream transcription activities. BET proteins also regulate various genes responsible for inflammation, apoptosis and cell cycle, which are all relevant to cancer progression. Here, we investigated the preventive effects of I-BET 762 in a clinically relevant lung cancer model. A/J mice were challenged with a single injection of the carcinogen vinyl carbamate. One week later, mice were fed control (AIN-93G) diet or I-BET (40 mg/kg diet) for 16 weeks. In mice treated with I-BET 762, the number (52% reduction) and size (80% reduction) of tumors were significantly ($p<0.05$) lower than the control group. I-BET 762 not only induced growth arrest and downregulation of pSTAT3 and pERK proteins in lung cancer cells but also increased the numbers of CD45+ immune cells and decreased the percentage of tumor-promoting macrophages in the lungs. These results suggest the striking effects of I-BET 762 are the result of targeting multiple pathways in lung cancer.

ENGINEERING DOMINANT MYC TRANSCRIPTION FACTORS FOR ENHANCED TRICHOME-MEDIATED PEST RESISTANCE IN TOMATO
Ryan Humphrey (Duke University)
Category & Time: Cell Biology, Genetics and Genomics, Section 3, 1:00 PM - 2:15 PM
Poster: 165
Mentor(s): Yani Chen (Plant Biology), Gregg Howe (Plant Biology), Koichi Sugimoto (Plant Biology)

Jasmonate (JA) signaling is a key regulatory mechanism by which plants defend themselves against predation from pathogens and insect pests. Glandular trichomes are epidermal structures that produce and secrete metabolites, such as terpenoids and flavonoids. Type VI glandular trichomes confer resistance to herbivory through these secretory metabolites, and have been shown to be regulated by JA signaling. MYC is a bHLH-type transcription factor (TF) that controls the expression of JA-regulated genes. In the canonical JA pathway, JAZ proteins bind to and repress MYC in the absence of JA. In the presence of JA, JAZ proteins are degraded to relieve repression on MYC TFs, which in turn, activates the expression of target defense genes. The aim of this project is to utilize site-directed mutagenesis polymerase chain reaction (PCR) to alter the JAZ-interacting domain in MYC TFs from tomato (Solanum lycopersicum). This approach has previously been used to create constitutively active MYC-mutants in the model plant Arabidopsis, but it has not yet been extended to crop plants. We anticipate that the construction of dominant MYC mutants expressed specifically in tomato type VI glandular trichomes may improve resistance of this crop to a broad spectrum of pests and pathogens. Additionally, the interaction between the mutant-MYC proteins will be tested in a yeast two-hybrid screen with tomato JAZ proteins, and the MYC co-activator MED 25 as well.

EFFECTS OF EARLY LIFE UNDERNUTRITION ON SKELETAL MUSCLE IN MICE
Austin Wellette-Hunsucker (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 3, 1:00 PM - 2:15 PM
Poster: 166
Mentor(s): David Ferguson (Kinesiology), Ashley Triplett (Kinesiology)

Previous research has shown that individuals exposed to brief periods of undernutrition in early life have altered cardiac structure and function leading to CV disease later in life, but it is unknown if skeletal muscle is affected. Physical activity via resistance training has been shown to increase muscle mass and force. The purpose was to determine if muscle size was different between mice placed in three diet groups that participated in voluntary wheel running during adulthood. Using a cross fostering model, we undernourished pups during gestation (GUN) or lactation (PUN) by feeding dams a low protein diet. At PN45 mice were placed in cages with free moving running wheels, which recorded number of spins/day. Control (CON) mice were restricted to standard cage activity. At PN70, the weight of five different muscles (extensor digitorum longus (EDL), soleus, gastrocnemius, plantaris, and quadriceps) were measured from mice in each group. Differences in muscle weight between the three groups were evaluated via ANOVA ($p<0.05$). CON and GUN groups appeared to run a similar amount (19412 spins/day vs 29383 spins/day). However, the PUN group appeared to run significantly less, on average 17381 spins/day. Results showed a lack of statistical significance in difference of muscle weights across all muscles and diet groups (EDL $p=0.55$, soleus $p=0.28$, plantaris $p=0.92$, and quadriceps $p=0.86$), except for the gastrocnemius ($p=0.0002$). This indicates that with access to voluntary wheel running, the only difference in muscle weight observed between the three diet groups was in the gastrocnemius

USING METAGENOME ASSEMBLED GENOMES TO INVESTIGATE THERMOPHILES IN THE SOILS OVERLYING THE CENTRALIA, PA COAL FIRE
Jane Lee (George Washington University)
Category & Time: Cell Biology, Genetics and Genomics, Section 4, 2:30 PM - 3:45 PM
Poster: 170
Mentor(s): Ashley Shade (Microbiology & Molecular Genetics), Jackson Sorensen (Microbiology & Molecular Genetics)

The importance of thermophiles is indisputable, given their role as models for early life and their potential as a source for biologically active enzymes and compounds. Despite requiring high temperatures for growth, thermophiles are ubiquitous in temperate soils. Here, we examine thermophiles in the usually temperate soils of Centralia, Pennsylvania, an environment generally not apt for thermophiles to grow. However, Centralia is the site of a burning underground coal fire since 1962 which elevated soil temperatures, allowing thermophiles to grow, and us to observe genes of thermophiles important for their success in normally temperate soils. This study explores these thermophiles' genes by studying twelve distinct sites from Centralia with temperatures between 12.1°C and 57.4°C. This study takes into consideration two datasets: DNA of thermophiles cultured at 60°C from the hottest soil at the time of collection, and DNA directly extracted from this soil. We quality control sequenced DNA from the two original datasets and assemble it. We binned the contigs into sixteen metagenome assembled genomes (MAGs) based on their abundance patterns and tetranucleotide frequency, of which seven were > 50% complete and < 10% contaminated. We quality controlled MAGs and determined their taxonomy using the Microbial Genomes Atlas. Ultimately, we observe these MAGs' response patterns to the fire and annotate their gene content to identify genes important for thermophile growth. The results and processes from this examination could be applied to a legion of different ideas relating to changes in gene content in a variety of organisms.

DIFFERENTIAL EFFECTS ON MITOGENESIS AND TRANSFORMATION OF ADIPOSE TISSUE-DERIVED FIBROBLAST GROWTH FACTOR-2
Star-Kayla Lewis (Spelman College)
Category & Time: Cell Biology, Genetics and Genomics, Section 4, 2:30 PM - 3:45 PM
Poster: 171
Mentor(s): Jamie Bernard (Pharmocology & Toxicology)

Abdominal (visceral) adiposity is associated with increased cancer incidence, but the mechanism isn't well-understood. Our previous data demonstrated that fibroblast growth factor 2 (FGF2, FGF basic) in visceral adipose tissue stimulates cell transformation (tumorigenicity), as measured by growth in 3D cell culture (soft agar). Here, transformation is defined as the post initiation steps a non-tumorigenic cell under goes to become tumorigenic. We also demonstrated that serum FGF2 is associated visceral adiposity-promoted with skin tumor formation in pre-clinical mouse model of carcinogenesis. These data suggest that FGF2 from visceral adipose tissue contributes to tumor onset. The levels of FGF2 found in mouse serum were sufficient to stimulate cell transformation but not cell proliferation in vitro. Therefore, we hypothesize that the transforming activity (growth in 3D culture) of FGF2 is separate from it's proliferative activity (growth in 2D culture). The objective of this study was to compare the transforming activity and mitogenic activity of FGF2 at various doses to other adipose tissue-derived mitogenic factors: leptin and estrogen. Leptin has been shown to stimulate proliferation but not transformation in other models, whereas, estrogen has been shown to stimulate both. I will use two non-tumorigenic cell lines to test our hypothesis: JB6 P+ epidermal cells and MCF-10A mammary epithelial cells. The completion of these studies will suggest a new function for FGF2 in visceral adiposity-associated tumorigenesis.

DIFFERENTIAL EFFECTS OF ESTROGEN DEFICIENCY AND TYPE 1 DIABETES ON THE SMALL INTESTINE
Heather Mallin (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 4, 2:30 PM - 2:30 PM
Poster: 172
Mentor(s): Laura McCabe (Physiology)

Type 1 Diabetes (T1D) and estrogen deficiency (ED) have both been shown to cause bone loss and well as changes in the gastrointestinal tract. As the lifespan of T1D patients increases, as does the number of post-menopausal women who may be especially susceptible to osteoporosis and GI problems. Previous examination of the effect of T1D and ED (modeled by ovariectomy) separately and together on the morphology of the small intestine showed an increase in ileal villus length with T1D and that T1D had a larger effect than did ED. Several parameters including villus width, crypt width, and crypt depth showed significant changes only in the combined T1D+ED condition. Considering these changes in growth, my current research will include measuring the mRNA expression of proliferating cell nuclear antigen (PCNA) as a marker of DNA replication, bcl-2-associated X (BAX) as a marker of apoptosis, and stem cell markers to explain how T1D and ED work to elicit these changes. I will additionally relate goblet cell counts to the expression of genes related to goblet cell and mucus production as an indication of intestinal barrier function. Together, these results will help to characterize the effect of T1D and ED separately and combined on the small intestine.

ATRAZINE INDUCED DNA DAMAGE IN CRAYFISH HEPATOPANCREAS QUANTIFIED THROUGH THE COMET ASSAY OF SINGLE CELLS
Monir Mardini (University of Detroit Mercy)
Category & Time: Cell Biology, Genetics and Genomics, Section 4, 2:30 PM - 3:45 PM
Poster: 173
Mentor(s): Rachelle Belanger (Biology), Jacob Kagey (Biology)

Atrazine is an herbicide that is used in agricultural, rural, and suburban settings. Atrazine is currently banned in countries outside the United States including the European Union, yet it is used in the United States. Due to atrazine's properties of solubility, it runs off into water sources and is incorporated in the water cycle affecting living organisms in regions far from the sites of its initial use. Crayfish are studied because of their classification as a keystone organism. We are using the comet assay to determine the amount of DNA damage associated with various concentrations of atrazine exposure. It has been previously shown that atrazine affects the behavior of crayfish by interfering with chemoreceptors, altering their abilities to find food and detect mates after an acute exposure that is attributed to possible neural degeneration. A comet assay is preformed to quantify DNA damage by assessing single cells of the hepatopancreas of crayfish treated with differing concentrations of atrazine. The results of the assay are analyzed through ImageJ with the open comet plugin that measures several different values that annotate the magnitude of DNA damage. The results demonstrate an increase in measured DNA damage throughout the different treatment levels using comet length, olive moment, and percent tail DNA. There is a trend evident that denotes an increase in damage as the concentrations of atrazine increase; furthermore, the comet assay along with a secondary test for DNA damage, H2AX staining, will broaden our understanding of atrazine's effects on DNA damage.

ATTENUATION OF THE INFLAMMATORY RESPONSE IN PANCREATIC CANCER WITH A MIXED LINEAGE KINASE INHIBITOR
Luke Miller (Hillsdale College)
Category & Time: Cell Biology, Genetics and Genomics, Section 4, 2:30 PM - 3:45 PM
Poster: 174
Mentor(s): Karen Liby (Pharmacology & Toxicology), Lyndsey Reich (Pharmacology & Toxicology)

Pancreatic Ductal Adenocarcinoma (PDAC) is an increasingly common and highly lethal form of cancer originating from initiating mutations in the Kras oncogene. Inflammation in the pancreas can accelerate tumor progression. The mixed lineage kinase (MLK) inhibitor, CEP-1347, could potentially ameliorate PDAC through its attenuation of the inflammatory response, especially by decreasing the infiltration of tumor-associated macrophages. In vitro, CEP-1347 dose dependently inhibits nitric oxide (NO) production in macrophage cells stimulated with lipopolysaccharide (LPS). The pancreatic cancer cell line, PanAsc, will be treated with CEP-1347 and changes in protein expression and cell proliferation will be assayed via western blot and MTT assay. In vivo, inflammation will be induced in a genetically engineered mouse model with a Kras mutation targeted to the pancreas, and these mice will be treated with CEP-1347. The development of pancreatitis and PDAC will be assessed via flow cytometry, immunohistochemistry, and western blot techniques. CEP-1347 treatment is predicted to decrease inflammation and macrophage infiltration into the pancreas, decreasing the incidence and severity of PDAC. Furthermore, inhibition of MLK and observation of the resulting changes will provide insight into the role of the MLK/JNK pathway in pancreatic cancer.

THE ROLE OF YORKIE IN DIFFERENT STAGES OF EYE DEVELOPMENT THROUGH THE UTILIZATION OF DIFFERENT BINDING PARTNERS OF DROSOPHILA MELANOGASTER.
Batoul Nasser (University of Detroit Mercy), Maria Anderson (University of Detroit Mercy)
Category & Time: Cell Biology, Genetics and Genomics, Section 4, 2:30 PM - 3:45 PM
Poster: 175
Mentor(s): Tiffany Cook (Moleculer Medicine and Genetics), Jacob Kagey (Biology)

The transcription factor Yes-associated protein (YAP) and the Drosophila melanogaster homolog, Yorkie (Yki) regulate organ size and other key developmental aspects. We utilized the UAS/Gal4 system and RNAi to study the knockdown of Yki and its binding partners to identify their role of eye development. The eye is used as a model system to study the role of Yki in growth, survival, and differentiation throughout different stages of development. Yki is known to contribute to cell survival, cell growth and cell signaling in the Drosophila eye and other tissues. Misexpression of Yki leads to both tissue overgrowth and undergrowth. Using the eye has allowed Yki to be studied during both the

adult stage to look for phenotypic changes, and the larval stage to use microscopy to stain for molecular changes. To conduct this experiment we are using Gal4 drivers, such as eyeless and GMR, to observe the role Yki and potential binding partners, scalloped and smad, roles in the development of the eye. Preliminary data suggests that a decrease in the size of the eye when using the driver eyeless in YkiIR corresponds with a similar phenotype in thick veins RNAi (tkvIR). Determining the effects on cell growth, regulation and signaling in Yki and its binding partners is important to understanding the effects of YAP in many cancers.

JANTHINOBACTERIUM LIVIDUM AND PSEUDOMONAS CHLORORAPHIS; TWO STRONGLY PIGMENTED STRAINS ISOLATED FROM THE RED CEDAR RIVER.
Marisa Nunez (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 4, 2:30 PM - 3:45 PM
Poster: 176
Mentor(s): Terence Marsh (Microbiology & Molecular Genetics)

The genus Janthinobacterium and species Pseudomonas chlororaphis both have the ability to produce colored pigment in response to certain environmental conditions. Janthinobacterium produces a purple pigment named violacein which is thought to be controlled by the carbon source and the presence of an antibiotic. It has a role as a possible antioxidant and has antimicrobial and antifungal properties. P. chlororaphis produces a metabolite called phenazine-1-carboxylic acid (PCA), a yellow orange pigment, regulated by quorum sensing. Both pigments are associated with biofilm formation. We have isolated 32 putative strains of Janthinobacterium and 4 strains of P. chlororaphis from Red Cedar sediment by selection on Pseudomonas isolation agar. Strains were grown on media with glucose and glycerol as main carbon sources and characterized phylogenetically using rRNA comparative sequencing and analyzed for pigment differences. Janthinobacterium strains showed slightly darker pigmentation when grown on glycerol compared to glucose. The pigment was extracted and absorbance profiles were measured to look at pigment characteristics. Only P. chlororaphis produced pigments that were secreted in the broth. Strains were also screened for production of biofilm and gentamycin-inducible small-colony variant production.

GENETIC SUPPRESSOR SCREEN IN VIBRIO CHOLERAE TO ELUCIDATE A NOVEL SECOND MESSENGER SIGNALING SYSTEM
Macy Pell (University of Wisconsin-Madison)
Category & Time: Cell Biology, Genetics and Genomics, Section 5, 2:30 PM - 3:45 PM
Poster: 179
Mentor(s): Geoffrey Severin (Biochemistry & Molecular Biology), Christopher Waters (Microbiology & Molecular Genetics)

The diarrheal disease cholera remains a global health burden, causing millions of infections and hundreds of thousands of deaths annually. The Vibrio cholerae O1-serogroup has been responsible for most cases of cholera and is divided into two biotypes: classical and El Tor. El Tor is believed in part to have superseded the classical biotype due to the acquisition of two unique genomic islands (VSP-1 and 2), but the role of these islands in the emergence of El Tor is not known. VSP-1 encodes a dinucleotide cyclase (DncV) that synthesizes the signaling molecule cyclic AMP-GMP (cGAMP). The function of cGAMP signaling in El Tor is unknown. We have identified novel colony morphology phenotypes associated with the overexpression of DncV and an enzymatically inactive DncV variant, DncV*, in the El Tor biotype. We leveraged these phenotypes to screen a random library of Tn5 transposon mutants for atypical colony morphologies following ectopic expression of DncV and DncV*. The screen yielded 8 DncV and 23 DncV* insensitive mutants. Mapping the locations of a few of these mutants identified a novel phospholipase, VC0178, which is encoded on the VSP-1 island and degrades phospholipids in the cell membrane following activation by cGAMP. Further mapping the remaining mutations will uncover additional genes involved in both the enzymatic and non-enzymatic role of DncV in El Tor host survival. Characterization of this regulon will reveal the role of VSP-1 in the current El Tor pandemic along with molecular targets that will help to develop therapeutic treatments for cholera.

RELEVANCE OF INOSITOL-REQUIRING ENZYME 1 UNDER ER STRESS IN CELLULAR RESPIRATION
Jariel Ramirez (University of Puerto Rico Cayey)
Category & Time: Cell Biology, Genetics and Genomics, Section 5, 2:30 PM - 3:45 PM
Poster: 180
Mentor(s): Christina Chan (Chemical Engineering), Amrita Oak (Chemical Engineering)

In mammalian cells, Inositol-requiring enzyme 1 (IRE1) is a protein in the ER membrane that has been shown to play a crucial role in cellular survival and apoptosis. When IRE1 activation occurs, usually by Endoplasmic Reticulum (ER) stress, cells tend to exhibit apoptotic responses. Palmitate is a fatty acid known to cause ER stress, leading to dimerization and activation of IRE1; ultimately leading to a survival or apoptotic response. We do not know precisely how palmitate causes a metastatic or apoptotic response via IRE1 activation; however, we expect to find a lead by verifying the multiple steps of oxygen consumption of cells, which may pilot to an insight through the cell's respiration changes. With the use of MitoXpress®Xtra, we measured the oxygen concentrations in a 96 well plate. Inside the plate, there was wild-type and IRE1 knock-out (KO) MEF cells, some under normal conditions and others having an induced ER stress through palmitate. We expect to find similar oxygen consumption rates between wild-type and IRE1 KO, yet when inducing ER stress we presume the IRE1 KO cell line will show apoptotic responses. If the expected results happen, the search for a pathway between cell-respiration and IRE1 could present a novel approach in the search for a cure or treatment for cancer, neurological diseases and many other illnesses.

DETERMINING THE MECHANISM BY WHICH A NOVEL SIGNALING SYSTEM REGULATES MOTILITY IN VIBRIO CHOLERAE
Christopher Rhoades (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 5, 2:30 PM - 3:45 PM
Poster: 181
Mentor(s): Geoffrey Severin (Biochemistry & Molecular Biology), Christopher Waters (Microbiology & Molecular Genetics)

Vibrio cholerae, a pathogenic bacterium, is the causative agent of cholera disease. Cholera is a global health burden accounting for millions of infections and hundreds of thousands of deaths annually. The cause of the current pandemic, the El Tor V. cholerae biotype, has supplanted the classical biotype as the primary cause of modern day cholera due in part to the acquisition of two novel gene islands, VSP-1 and VSP-2. While most of the genes on these genomic islands have yet been characterized, they are hypothesized to enhance environmental and host persistence and reduce motility of El Tor. The reduction of motility is a critical event during El Tor host colonization and the VSP-I gene, VC0179 (DncV), is important for this process. DncV is a dinucleotide cyclase, whose predominant product is the hybrid cyclic di-nucleotide, cyclic-GMP-AMP (cGAMP). Ectopic expression of DncV in El Tor results in a decreased capacity to diffuse through low-density agar and this chemotactic phenotype can be relieved following deletion of the putative-phospholipase, VC0178. The mechanisms by which DncV, cGAMP and VC0178 regulate chemotaxis are unknown. Using a bi-plasmid DncV overexpression system, we have identified 36 spontaneous mutants that suppress cGAMP induced chemotactic inhibition. Identifying the locations of genomic mutations occurring in these mutants, through targeted and whole-genome sequencing, will reveal the molecular mechanism by which cGAMP regulates chemotaxis. These studies will provide insight into understanding the enhanced pathogenic capacity of the El Tor biotype and cGAMP's role in environmental persistence and virulence of El Tor V. cholerae.

METHYLMERCURY AFFECTS NRF2 AND KEAP1 MRNA EXPRESSION IN SPINAL CORD ASTROCYTES
Johayrie Ann Rios Arce (University of Puerto Rico at Arecibo)
Category & Time: Cell Biology, Genetics and Genomics, Section 5, 2:30 PM - 3:45 PM
Poster: 182
Mentor(s): Duanghathai Wiwatratana (Pharmacology & Toxicology)

Loss of redox homeostasis is involved in methylmercury (MeHg)- induced cell death. In the central nervous system, astrocytes are the first cells exposed to MeHg and accumulate mercury more than neurons. Neurons, however, are more susceptible to MeHg than astrocytes. Astrocytes play an important role in neuronal protection by supplying antioxidant glutathione (GSH) to neurons, especially during oxidative stress. A master regulator of antioxidants in cells, called nuclear factor erythroid 2–related factor 2 (Nrf2), regulates the expression of several antioxidant genes including GSH precursors. Astrocytes loss of redox homeostasis during MeHg exposure could potentially lead to a loss of redox homeostasis in neurons which could contribute to neuronal death. In this study, the spinal cord astrocyte cell cultures were exposed to 0.5μM MeHg for 30 min, 1 h and 3 h. The Nrf2 mRNA levels were induced to 2.4, 1.5 and 2.4-fold of expression during 30 min, 1h and 3h MeHg exposure, respectively. Keap1 mRNA levels were induced to 1.7, 3.9 and 0.4 fold of expression corresponding to those time points, respectively. Interestingly, the expression levels of Keap1 and Nrf2 mRNA appear to be correlated. The Nrf2 mRNA decreased while Keap1 mRNA greatly increased. When Keap1 mRNA was greatly reduced, Nrf2 mRNA level was up-regulated. The fluctuation of Nrf2 and Keap1 mRNA expressions during MeHg exposure suggested the imbalance of redox homeostasis in astrocytes. The up-regulations of Nrf2 expression is to maintain the redox homeostasis during MeHg exposure.

THE EXPRESSION OF EXCITATORY AMINO ACID TRANSPORTER 1 AND 2 MRNA DURING METHYLMERCURY EXPOSURE IN SPINAL CORD ASTROCYTES
Kimberly Ann Rivera-Caraballo (University of Puerto Rico at Humacao)
Category & Time: Cell Biology, Genetics and Genomics, Section 5, 2:30 PM - 3:45 PM
Poster: 183
Mentor(s): Duanghathai Wiwatratana (Pharmacology & Toxicology)

Excitotoxicity and oxidative stress are involved in methylmercury (MeHg)-induced neuronal death. Astrocytes play a critical role in neuronal protection from excitotoxicity by elimination of extracellular glutamate from the synapses through the excitatory amino acid transporter 1 and 2 (EAAT1 and EAAT2). Mercury and reactive oxygen species (ROS) reportedly inhibit EAAT1 and EAAT2 re-uptake of extracellular glutamate. MeHg also induces ROS generation in cortical and cerebellar astrocytes. In the spinal cord, where motor neuron degeneration occurs, the role of spinal cord astrocytes in MeHg-toxicity has not been fully characterized. We hypothesized that MeHg could induce the down-regulation of EAAT1 and EAAT2 mRNA expression in spinal cord astrocytes. Subsequently, excitotoxicity and, eventually, neuronal death occurs. In this study, spinal cord astrocyte cell cultures were exposed to 0.5μM MeHg for 30 min, 1h and 3h. The expression level of EAAT1and EAAT2 mRNAs were determined using quantitative polymerase chain reaction. At 30 min, EAAT1 and EAAT2 mRNA levels were not altered. During 1h and 3h exposure, the EAAT2 mRNA levels were slight affected. The EAAT1 mRNA levels appeared to increase about 2.4 fold at 1h exposure then greatly decline its expression to 0.5 fold at 3h. The increase and later decrease of EAAT1 mRNA levels suggests astrocytes earlier attempt to buffer the glutamate-mediate excitotoxicity and the subsequent reduction of EAAT1 expression could exacerbate excitotoxicity occurring during MeHg-toxicity.

THE FIBRINOLYTIC ENZYME PLASMIN DIRECTLY ACTIVATES MACROPHAGES
Maribel Rodriguez (St Mary's University)
Category & Time: Cell Biology, Genetics and Genomics, Section 5, 2:30 PM - 3:45 PM
Poster: 184
Mentor(s): Bryan Copple (Pharmacology & Toxicology), Justin Ingram (Pharmacology & Toxicology), Katheryn Roth (Pharmacology & Toxicology), Kathryn Wierenga (Pharmacology & Toxicology)

Studies have shown that inhibition of the fibrinolytic enzyme, plasmin, in mice prevents macrophage activation after liver injury. This causes a decrease in cytokine production and impairs liver repair. The mechanism by which plasmin regulates the activity of macrophages in the liver remains unknown. In the present studies, we tested the hypothesis that plasmin directly activates macrophages. To test this hypothesis, bone marrow-derived macrophages and Kupffer cells were isolated from mice and treated with plasmin. Activation of macrophages was quantified by upregulation of proinflammatory cytokines. Treatment of bone marrow-derived macrophages and Kupffer cells with plasmin increased expression of tumor necrosis factor-alpha (TNF-alpha), macrophage inflammatory protein-2 (MIP-2), and keratinocyte-derived chemotactic factor (KC). Plasmin also caused a significant change in macrophage shape. Upregulation of cytokines and shape changes were inhibited by the plasmin inhibitor, tranexamic acid. To gain some insight into the mechanism by which plasmin increased cytokine levels, we next evaluated several key signal transduction pathways. These results demonstrated that plasmin activated Erk1/2, Jnk, NF-kB, and p38. Collectively these studies demonstrate that the fibrinolytic enzyme, plasmin, directly activates macrophages. Future studies will be conducted to identify which signaling pathways activated by plasmin are important for plasmin-mediated upregulation of cytokines. Supported by NIH grant DK073566.

ANTIPLATELET MEDICATION TRIGGERS LIVER FAILURE: A CASE REPORT
Nick Corsi (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 5, 2:30 PM – 3:45 PM
Poster: 185
Mentor(s): Mina Guerges (General Surgery)

There are hundreds of thousands of prescriptions of the antithrombotic agent, Clopidogrel, filled every year. Marketed as Plavix, this medication is administered as a blood thinner and is argued to be as safe as aspirin. The drug is generally tolerated with gastrointestinal side-effects, like nausea and vomiting. However, only a few cases of the life-threatening side effect of symptomatic liver failure have been published in medical literature. We hereby present a 60-year-old male who was initiated on Plavix after percutaneous coronary intervention and subsequently developed severe thrombocytopenia with hepatotoxicity a month later. The patient had an acute onset of fever and associated symptoms of jaundice and fatigue. A thorough differential diagnosis was conducted to rule out external causes, which incorporated CT scans of the Chest and Abdomen, abdominal ultrasound, pan-cultures, and extensive blood work. The condition completely resolved two weeks after discontinuation of the medication, and the patient reached baseline liver enzymes. Recognition of a rare side effect secondary to Plavix use requires a perceptive differential diagnosis. No published report has found the true mechanism behind Clopidogrel-hepatotoxicity, however it has been suggested that it is likely a non-dose dependent immunological response. Though incredibly rare, this case report intends to increase clinician awareness of therapeutic drug-induced liver injury.

THE DEVELOPMENT OF THE ENTERIC NERVOUS SYSTEM AND THE GUT MICROBIOME
Shakira Rodriguez Gonzalez (University of Puerto Rico at Cayey)
Category & Time: Cell Biology, Genetics and Genomics, Section 6, 2:30 PM - 3:45 PM
Poster: 186
Mentor(s): Brian Gulbransen (Neuroscience)

The enteric nervous system (ENS) is a complex network of neurons and glial cells organized in two plexuses that function to coordinate the gastrointestinal tract. Its development occurs within a constantly changing environment, which, after birth, ends in the establishment of the gut microbiome. The gut microbiome has been linked with the development of the ENS and the physiology of the gut. However, how altering the microbiome affects the development of the ENS is not clear. We hypothesized that depleting the microbiome by exposure to antibiotics during prenatal and postnatal development impairs the maturation of the ENS. We will test our hypothesis by assessing the effects of antibiotics on the activity and anatomy of the ENS in mice expressing the genetically encoded calcium indicator GCaMP5g and the fluorescent reporter tdTomato in either neurons or glia. Neuronal and glial expression will be driven by crossing reporter mice with Nestin-Cre or Sox10Cre^{ERT2} mice, respectively. Pregnant females will receive an antibiotic cocktail in drinking water after breeding and throughout pregnancy. Control females will receive normal drinking water. Samples of the colon and ileum will be harvested from pups at postnatal days 7 and 14 to image the spontaneous activity of neurons and glial cells using GCaMP5g fluorescence. We will analyze the architecture of the ENS by imaging tdTomato fluorescence in neurons and glia. We anticipate that the results from our study will provide important insight into the effects of antibiotics on the neural control of the digestive tract.

IDENTIFICATION OF ANTIBIOTIC RESISTANCE BACTERIAL ISOLATES AND GENES FROM CANADIAN GEESE FECES AND SOIL SAMPLES FROM MICHIGAN STATE UNIVERSITY AND THE IMPACT ON PUBLIC HEALTH
Benjamin Russell (Michigan State University), Brenden Cabana (Michigan State University), Summer Stefanko (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 6, 2:30 PM - 3:45 PM
Poster: 187
Mentor(s): Poorna Viswanathan (Microbiology & Molecular Genetics)

Antibiotic resistance is the ability for bacteria to resist the effect of drugs and continue to thrive in the environment. Antibiotic resistant bacteria in the environment is a growing concern towards public health. Canadian geese are an avian species that are impacting public health due to the spread of these antibiotic resistant bacteria. Canadian geese feces contain antibiotic resistant bacteria that are harmful to

humans and wildlife due to the high pathogenicity of these microorganisms. The presence of antibiotic resistant bacteria contained in Canadian geese feces and soil samples from Michigan State University will have an impact towards public health. The bacteria identified from the feces and soil samples were multi-drug resistant. For qPCR, the percentage of cells with blaTEM was 1.37% and the percentage of cells with tet(W) was 2.84%. The hypothesis was supported where each bacterial strain of interest had antibiotic resistance. This exposure of antibiotic resistant bacteria can create hard-to-treat infections and make genes that contain resistance spread to other bacteria in the environment. The future impact of antibiotic resistant bacteria is the challenge to prevent the pathogenicity of these microorganisms to the public.

ACTIVATION OF LIVER X RECEPTORS AND THE POTENTIAL TO PREVENT THE PROGRESSION OF DIABETIC RETINOPATHY
Mercedes Serratos (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 6, 2:30 PM - 3:45 PM
Poster: 188
Mentor(s): Julia Busik (Physiology), Elahé Crockett (Medicine), Sandra Hammer (Physiology)

Background: Recent clinical trials suggest that dysregulation of cholesterol metabolism significantly contributes to the pathogenesis of diabetic retinopathy (DR), the number one cause of blindness among working age individuals. Liver X receptors (LXRα/LXRβ) are the central regulators of cholesterol elimination by activation of the reverse cholesterol transport (RCT) pathway. Specifically, LXRs promote cholesterol efflux by activation of ATP-binding cassette transporters, ABCA1 and ABCG1. Aim: This study examines the role of LXR activation in control and diabetic human retinal endothelial cells (HREC). Methods: HRECs isolated from diabetic and non-diabetic control donors were treated with tumor necrosis factor (TNFα) (10ng), and/or LXR agonist DMHCA (1ug) for 24hrs. RNA was isolated, converted to cDNA and analyzed by real time-PCR for LXRα, ABCA1 and ABCG1. Cyclophilin-A was used as a loading control. One-way ANOVA was used for statistical analysis. Results: Treatment of HRECs with DMHCA (1ug) significantly increased LXR signaling targets, ABCA1 and ABCG1. This increase was seen in the presence of pro-inflammatory cytokine TNFα stimulation (TNFα vs. TNFα+DMHCA, ABCA1: n=3, p=0.0031; ABCG1: n=3, p=0.0026) as well as in the presence of diabetes (diabetes vs. diabetes+DMHCA, ABCA1: n=3, p=0.0001; ABCG1: n=3, p=0.0001). Conclusion: LXR agonists such as DMHCA effectively increase RCT genes in control, diabetic and cytokine-treated HREC. These data suggest that LXR agonists can be used as a strategy to normalize cholesterol metabolism in diabetic retina. Support: M.S. is a REPID scholar, supported by NIH-5-R25-HL108864 Award to Elahé Crockett, REPID-Program Director; NIH RO1EY016077-01A1 to Julia V. Busik.

BEST DRYING TECHNIQUE FOR MANGOES
Dezmond Spencer (Tuskegee University)
Category & Time: Cell Biology, Genetics and Genomics, Section 6, 2:30 PM - 3:45 PM
Poster: 189
Mentor(s): Kirk Dolan (Food Science & Human Nutrition)

Mangoes are one of the most important tropical fruits that can be consumed or processed globally, and most developing countries are starting to embrace the drying of mangoes. Many antioxidants, Vitamin A and Vitamin B and found in dried mangoes. Mango cubes were cut and dried using two functional drying techniques, infrared and natural air. They were then tested for total carotenoids, total phenolics, vitamin C content, and their antioxidant levels. They were also tested for their weight and moisture content before and after they were dried, with the purpose of establishing how much water weight had been lost due to the drying. We can predict that the infrared drying technique will prove to be a better technique than the natural air technique. Infrared drying radiation will maintain the mangoes antioxidants and vitamin levels better than the natural air drying technique. In a previous study, “Total phenolics, carotenoids and antioxidant properties of Tommy Atkin mango cubes as affected by drying techniques” LWT-Food Science and Technology 62.1 (2015): 564-568 by Sogi, Dalbir Singh, Muhammad Siddiq, and Kirk D. Dolan, it states that the infrared drying technique proved more beneficial than the other drying methods according to the results from their small sample size. With the sample size being small it proved to be hard to determine if the infrared drying method is in fact the best method.

STATUS-RELATED SOCIAL STRESS ALTERS REWARD CIRCUITRY GENE EXPRESSION
Audrianna St. Germain (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 6, 2:30 PM - 3:45 PM
Poster: 190
Mentor(s): AJ Robison (Physiology)

Social status is an important determinant of both stress level and stress response. It is known that social stress is a critical mediator of susceptibility to depression and addiction in humans, but addiction and depression models using social stress in mice do not always take social status into account. Therefore, we designed a novel social rank model that establishes a social status, then imposes a two week reranking, which applies a social stressor with face and construct validity. In the brain, the reward circuitry is central to stress susceptibility and mediates reward- and addiction-related behaviors. Thus, we used qPCR of mRNA from adult male mouse brain to measure expression of select genes important for reward circuitry function and stress/reward behaviors in our reranked mice to assess the molecular mechanisms induced by social stress. We found that expression of one gene in particular, FosB, a well established mediator of both depression- and addiction-related behaviors, is inversely correlated with change in social rank in nucleus accumbens. We are now investigating more genes and reward-related brain regions. Thus, but our preliminary results indicate that long-term adaptions in gene expression in reward circuitry may be associated with status-related social stress responses.

TESTING SAMPLE DNA
Veronica Stafford (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 6, 2:30 PM - 3:45 PM
Poster: 191
Mentor(s): Patrick Venta (Microbiology & Molecular Genetics)

This poster presents the sample testing done to identify the gene that codes for paraparesis of the hind legs in pugs. Primer designing, gel electrophoresis, typooning, were performed to identify the gene in question. Testing of the actual dog DNA has not yet been performed due to the limitation of time. Once the gene that codes for paraparesis in pugs is located, breeders will be able to select for pugs that do not have the gene in order to, eventually, get rid of the undesirable trait.

ELUCIDATING THE MECHANISM OF VIRULENCE IN E.COLI O104:H4: IDENTIFICATION OF THE ROLE OF BIOFILMS IN STX-PHAGE INDUCTION
Neehal Tumma (Port Huron Northern High School)
Category & Time: Cell Biology, Genetics and Genomics, Section 7, 2:30 PM - 3:45 PM
Poster: 194
Mentor(s): Nico Fernandez (Microbiology & Molecular Genetics)

Escherichia coli O104:H4 is an enteroaggregative/shiga-toxin (Stx) producing strain and the cause of fatal diseases. Recent literature identified a correlation between biofilm gene expression and virulence. However, the mechanism was unknown. Therefore, it was hypothesized that O104:H4 biofilms induce lambda prophages, resulting in increased virulence. Transcriptional reporters were cloned into EcAB73. Cyclic di-GMP was elevated to induce production of biofilms. O104:H4 mRNA and phage DNA isolates were used as templates for qRT-PCR and qPCR. Target genes were q and stx. SOS promoters, recN and sulA, were fused to GFP reporters and cloned into O104:H4. The effects of Polysorbate (PS) on SF6 phage production and on various EAEC strain biofilm formation were examined. Results supported MMS and ciprofloxacin as being the most potent activators of the SOS response. stx gene copy number did not show a difference in lytic phage between biofilm and planktonic populations of E.coli O104:H4. stx and q gene expression demonstrated that virulence gene activity was not upregulated in biofilms. SF6 phage showed no changes in production dependent on PS concentration suggesting the viability of PS. Biofilm assays showed that EAEC biofilms were inhibited by PS, expanding the role of PS as a biofilm inhibition agent. recN and sulA promoter activity was not correlated to an increase in virulence gene expression. Based on the results, O104:H4 biofilms do not utilize lambda phages to increase their virulence; rather they utilize a different mechanism. The identification of this mechanism will allow for the development of novel therapeutics to cure O104:H4 infections.

WOLBACHIA-BASED VECTOR-BORNE DISEASE CONTROL: CYTOPLASMIC INCOMPATIBILITY ASSESSMENT OF MEXICAN AEDES AEGYPTI POPULATION
Alejandra Villegas (Northeastern Illinois University)
Category & Time: Cell Biology, Genetics and Genomics, Section 7, 2:30 PM - 3:45 PM
Poster: 195
Mentor(s): Xiao Liang (Microbiology & Molecular Genetics), Zhiyong Xi (Microbiology & Molecular Genetics)

Aedes aegypti is the primary transmission vector for dengue, chikungunya, and zika viruses among others. Continuous infections have prompted the use Wolbachia-induced cytoplasmic incompatibility (CI) as a method of vector-borne disease control. Wolbachia is a maternally transmitted, intracellular bacterium that infects about 62% of all insects. CI occurs when infected males mate with uninfected females. CI leads to unsuccessful embryonic development, to decreased hatching rates, and to mosquito population suppression. Desirable results have been observed when releasing Wolbachia-transinfected Ae. aegypti in Australia, China, and other countries. Field trials are currently pending in Mexico. CI, maternal transmission, fitness, and pathogenic interference determine effective Wolbachia transinfection. To ensure CI between lab and local populations, 4 CI crosses were set up between Ae. aegypti from Mexico (AFM) and Wolbachia-transinfected Ae. aegypti (WB-M). It is expected that crosses between Wolbachia-transinfected lab males and uninfected field females will lead to CI and an observed decreased hatching rate. Hatching rates will be analyzed using a Student's t-test. To ensure the competitiveness of released transinfected male mosquitoes, fitness, longevity, and mating success will be further studied in lab. Observed decreased hatching rates and massive release of transinfected males should lead to local mosquito population suppression and, as a result, to decreased vector-borne disease transmission.

UNDERSTANDING THE MISREGULATION OF COP9 SIGNALOSOME IN EPITHELIAL DERIVED CANCERS
Faith Volpe (University of Detroit Mercy), Travis Miller (University of Detroit Mercy)
Category & Time: Cell Biology, Genetics and Genomics, Section 7, 2:30 PM - 3:45 PM
Poster: 196
Mentor(s): Nicole Najor (Biology)

Epithelial tissues maintain their integrity due to cellular membrane junctions such as the desmosome. When mutations arise in many of the desmosomal genes, it can lead to harmful disorders. The desmosome is a membrane-bound protein junction known for its role in intercellular adhesion, its regulation of signalling molecules related to proliferation and differentiation, and its relationship with the COP9 signalosome. In normal tissue, the desmosome and COP9 mediate epidermal differentiation through a mechanism that inhibits epidermal growth factor receptor (EGFR) activity, a signaling pathway known to promote growth. This mechanism of dampening EGFR signaling, allows the suprabasal layers to properly differentiate and stratify. The eight-unit COP9 protein complex regulates protein degradation through the cleavage of a ubiquitin-like protein, Nedd8, from ubiquitin ligases. While it has been shown that both COP9 and EGFR are upregulated in certain cancers, it is undetermined whether their interactions or failure to interact with the desmosome contribute to the disease. Through the protein analysis of Nedd8 and desmosomal components in a variety of cancer cell lines, our research aims to clarify

the process by which a misregulation of COP9 creates a cancerous phenotype. Our data will be obtained by western blot analysis and protein immunoblotting. Further, densitometry quantification will be performed to address statistical significance. In this presentation, we will show differences in protein regulation across a range of epithelial cancer cell lines.

EXPLORING THE EFFECTS OF TRANSPOSABLE ELEMENTS ON ADJACENT GENES
Rachael Wolf (Iowa State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 7, 2:30 PM - 3:45 PM
Poster: 197
Mentor(s): Elizabeth Alger (Horticulture)

Transposable elements are DNA sequences with the ability to replicate and proliferate across the genome. Some TEs are independent: they contain sequences that allow them to replicate and proliferate on their own. Others depend on the dispersal mechanisms of other TEs. They are abundant in most if not all eukaryotic genomes and can have a significant effect on genes, including on their expression. Because of this, they have at times been called 'Control Elements'. TEs are usually methylated to suppress their proliferation and previous studies have shown genes with more TEs near them are often expressed at lower levels. This is likely because chromatin containing many methylated regions will be more tightly bound, making transcription more difficult. Here we explored more precisely how TEs affect the expression of nearby genes in a particular wild strawberry species: Fragaria vesca 'Hawaii 4'. To measure this, genome-wide associations between TEs, their methylation status, and the expression and methylation status of nearby genes were conducted. These results may help estimate TE content and its influence on modulating gene expression in other related species.

THE SWITCHGRASS PHYLLOSPHERE MICROBIOME: DIVERSITY AND MEMBER INTERACTIONS
Songhao Wu (Purdue University)
Category & Time: Cell Biology, Genetics and Genomics, Section 7, 2:30 PM - 3:45 PM
Poster: 198
Mentor(s): Ashley Shade (Microbiology & Molecular Genetics)

Microorganisms play an important role in the health of plants. Traditionally, microbiome research has focused on the influence of rhizosphere microbiota because roots are the location of nutrient uptake. However, there is limited knowledge regarding how phyllosphere microbiota can influence plants. With the purpose of maximizing biofuel production, we are interested in what benefits switchgrass phyllosphere microbiota may provide to their hosts. To understand the diversity and functions of switchgrass bacteria, we focus on switchgrass phyllosphere isolate identification and interactions. To identify isolates, we perform genomic DNA extraction from leaf washes, amplify the 16S rRNA gene using PCR, sequence the final amplicon with Sanger sequencing, and identify the organism by its nucleotide sequence using the Ribosomal Database Project's Classifier tool. Our isolate collection includes 60 bacteria. Next, we interrogate the relationships among these isolates to determine their interactions. To do so, we prepare cultivation assays to perform isolate-by-isolate growth comparisons, and observe neutral (no difference from control growth), antagonistic (inhibition; less growth than control), or synergistic (more growth than control) outcomes. Our method demonstrates a systematic way to identify phyllosphere bacteria and their interactions, which is fundamental for understanding the diversity, dynamics, and functions of the phyllosphere microbiome. Furthermore, understanding interactions among phyllosphere bacteria informs as to their specificity to their host habitat. Ultimately, understanding phyllosphere interactions will inform microbiome management or remodeling to improve switchgrass productivity and increase biofuel production.

THE DEVELOPMENT AND TREATMENT OF ACUTE PSEUDOMONAS AERUGINOSA INFECTIONS IN A MURINE MOUSE MODEL OF CYSTIC FIBROSIS
Mitchell Zachos (Michigan State University)
Category & Time: Cell Biology, Genetics and Genomics, Section 7, 2:30 PM - 3:45 PM
Poster: 199
Mentor(s): Michael Maiden (Microbiology & Molecular Genetics), Chris Waters (Microbiology & Molecular Genetics)

Cystic fibrosis (CF) is a genetic disease that leads to many complications in the human body. CF is caused by a mutation in the Cystic Fibrosis Transmembrane Conductance Regulator gene, leading to improper transport of sodium, chloride, and water molecules in the lungs. This creates an environment prone to infection. Pseudomonas aeruginosa is a multidrug-resistant pathogen that forms antimicrobial resistant biofilms in the lungs of CF patients. When current treatments fail to completely eradicate the infection, CF patients experience cycles of incomplete recovery. Our research aims to complete this recovery cycle with the use of antibiotic adjuvants. Presently, tobramycin is the most common therapy to treat P. aeruginosa infections in CF patients. However, it fails to completely eradicate infection. By performing a high throughput screen, we determined that the antimicrobial triclosan enhances tobramycin activity. Tobramycin combined with triclosan resulted in a ~2-log enhancement in bacterial biofilm killing compared to tobramycin alone in vitro. Based on this finding, we then tested this combination in vivo using a CF mouse model. CFTR deficient mice were inoculated with P. aeruginosa, and treated after 24 hours. The mice were sacrificed 6 hours later. The lungs were then harvested, homogenized, and plated onto Pseudomonas Isolation Agar to enumerate colony forming units. We found a ~2-log killing of the cells within P. aeruginosa biofilms compared to triclosan alone, and a ~5-log killing compared to tobramycin alone. Further development of this combination could lead to its re-purposing as a therapy for P. aeruginosa infections in CF patients.

CHEMICAL ENGINEERING & MATERIALS SCIENCE

UNDERSTANDING PROCESSING MICROSTRUCTURE PROPERTY RELATIONSHIPS IN TI-13CR-XFE-XAL ALLOYS
Afnan AlBatati (University of Wisconsin - Madison)
Category & Time: Chemical Engineering and Materials Science, Section 1, 1:00 PM - 2:15 PM
Poster: 203
Mentor(s): Carl Boehlert (Chemical Engineering & Materials Science)

To determine the effect of alloy composition and heat treatment on beta titanium alloy properties and microstructure, four beta-titanium alloys were made by quenching from the beta phase (Ti-13Cr-1Fe-3Al, Ti-13Cr-3Al, Ti-13Cr-1Fe, Ti-13Cr). The samples were heat treated at 400C for 12 hours. The effect of the heat treatment on the yield strength and ductility is determined using tensile, creep, and fatigue testing. The effect of heat treatment on the microstructure of these samples was determined before and after using XRD, SEM, and TEM.

LIGNIN DIMER SYNTHESIS FOR MODEL STUDIES OF BOND CLEAVAGE REACTIONS
Jake Aquilina (City University of New York)
Category & Time: Chemical Engineering and Materials Science, Section 1, 1:00 PM - 2:15 PM
Poster: 204
Mentor(s): Pengchao Hao (Chemistry), James Jackson (Chemistry)

New, effective tools are needed to convert biomass, a renewable resource, into liquid fuels, like gasoline. Replacing traditional fossil fuels with renewables would minimize net injection of fossil carbon into the atmosphere (as the greenhouse gas CO2), and slow consumption of finite fossil resources while still meeting the ever-growing world-wide demand for energy. A potential source of renewable carbon is lignin, part of the supportive framework of a plant's structure. Typically, found in wood and bark, lignin is a highly cross-linked collection of phenolic polymers. Properly broken down and hydrogenated, it may be converted into liquid hydrocarbons like those in gasoline, diesel, and related liquid fuels. However, methods are needed to cleave the many types of linkages in lignin's complex network. The immediate research challenge is to synthesize model compounds containing alpha-hydroxyl oxidized forms of the lignin beta-O-4 linkage, the predominant crosslink between the phenyl propane units in lignin. Cleavage of this bond will then be attempted by electrocatalytic hydrogenation or our novel thiol-based breakdown strategy. Due to natural lignin's size, nonuniform structure, and steric hindrance, this family of simple, chemically defined model substrates is for discovering and understanding cleavage reactions that can pinpoint this particular bond.

NANOSTRUCTURED BIOSENSOR FOR ORGANOPHOSPHATES COMPOUNDS DETECTION
Kevin Cruz (University of Puerto Rico Arecibo)
Category & Time: Chemical Engineering and Materials Science, Section 1, 1:00 PM - 2:15 PM
Poster: 205
Mentor(s): Neda Rafat (Biomedical Engineering), Robert Worden (Chemical Engineering & Materials Science)

Long term use of organophosphate (OP) compounds in industry and agriculture can make them apart of the environment, also this toxic compound can be used in warfare chemical weapons. Exposure to OP compounds can cause weakness, paralysis and even death. Some OP compounds can cause OP-induced delayed neuropathy (OPIDN), with symptoms that may take weeks to detect, making diagnosis slow and difficult. The traditional methods for detecting these compounds can be costly and time consuming. In contrast, biosensors are relatively inexpensive to produce and can generate a response in seconds. In addition, biosensors can be modified to contain different levels of sensitivity as well as enzyme or protein binding sites that are extremely specific, making the device strongly accurate. This study focuses on the development of an electrochemical biosensor that is capable of detecting OP's utilizing enzyme based oxidation of phenol and redox cycling of catechol. The biosensor under development will include a gold electrode modified with a layer by layer immobilization of enzymes and a polyelectrolyte. The enzyme will initiate a chemical pathway producing an electrical signal which is a measure of its activity. When the OP compounds enter into contact with the enzyme, the biosensor signal will quickly drop because of the inhibition of the enzyme, providing a fast and quantitative indication of OP presence. Taking the same approach as a glucometer and developing a portable OP biosensor, we want to adapt the biosensor to cheap printed carbon electrodes to minimize the assembly.

TEMPERATURE-DEPENDENT ELASTICITY AND SPEED OF SOUND IN THERMOELECTRIC MATERIALS
Michael Gonzalez Boehlert (European University of Madrid)
Category & Time: Chemical Engineering and Materials Science, Section 1, 1:00 PM - 2:15 PM
Poster: 206
Mentor(s): Alexandra Zevalkink (Chemical Engineering & Materials Science)

Thermoelectric materials, which convert heat into electricity and vice-versa, are used in applications ranging from space exploration, cooling systems, and waste-heat recovery . Efficient thermoelectric materials must have high electrical conductivity, high Seebeck coefficients, and low thermal conductivity. One approach to achieving low thermal conductivity, is to use materials with soft bonds, and thus, low sound velocities. The goal of this research is to explain trends in lattice thermal conductivity in thermoelectric materials by a deeper investigation of the elasticity and sound velocity of the samples as a function of temperature. We will use a non-destructive method called resonant ultrasound spectroscopy to determine the resonant vibrational modes of samples with well-defined geometries, from which we can extract the elastic properties. These measurements will be carried out in a custom high temperature apparatus at up to 600˚C in an inert atmosphere.

DEVELOPMENT OF A NANOLAYER ENZYME BIOSENSOR INTERFACE
Patrick Goughler (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 1, 1:00 PM - 2:15 PM
Poster: 207
Mentor(s): Neda Rafat (Chemical Engineering & Materials Science)

Enzyme biosensors are an innovative approach to the detection of chemical species in samples. The primary goal of this research is to develop an enzyme biosensor for the detection of organophosphates. This type of biosensor is based on previous work in the field of nanoscale interfaces and aims to observe an electrochemical dose response in the presence of neuroinhibitory organophosphates. Organophosphate compounds are widely used as pesticides and chemical warfare agents. These compounds can inhibit enzymes involved in nerve-transmission processes, such as acetylcholinesterase which breaks down the neurotransmitter acetylcholine after a nerve fires. Inactivation of acetylcholinesterase leads to an accumulation of neurotransmitters, resulting in overstimulation of muscles and a variety of clinical problems, sometimes resulting in death. Some organophosphate compounds can cause organophosphate-induced delayed neuropathy (OPIDN), whose symptoms can be slow to appear. Biosensors able to quickly detect organophosphate compounds could allow action to be taken more speedily, potentially saving lives. The intention of this project is to design a biosensor to be developed for use in the fishkeeping, veterinary, and medical industries as a quick, inexpensive alternative to conventional methods. This biosensor is advantageous in medical applications, where quick, quantified results could reduce the duration of exposure to organophosphate compounds and subsequently reduce the risks associated with them. Multiple layering and enzyme immobilization methods have been tested using chronoamperometry and cyclic voltammetry techniques to evaluate the redox reaction of immobilized enzymes. The goal of this project is to transition existing acetylcholinesterase biosensors to a screen-printed electrode for commercial production.

DEVELOPMENT OF GROWTH SELECTION CONDITION FOR ADAPTIVE EVOLUTION OF ENZYMES
Justin Hosten (University of Maryland Baltimore County)
Category & Time: Chemical Engineering and Materials Science, Section 1, 1:00 PM - 2:15 PM
Poster: 208
Mentor(s): Tim Whitehead (Chemical Engineering & Materials Science), Matthew Faber (Biochemistry & Molecular Biology)

Proteins are biological macromolecules that can perform a lot of jobs within the body, but also can serve to be functional outside. Proteins are useful in industry by converting many chemicals into more useful, important, or rare products in less steps and are function in the medical field by being used to fight many diseases. The more that is understood of its function and rate of evolution, the more useful it can be within our daily lives. We are interested in seeing if there is a relationship between ancestral protein stability and rate of evolution and in order to study this, we are studying a destabilized variant of Amidase-E (Ami-E), naturally found in Pseudomonas aeruginosa, within E. coli by looking at it's distribution of fitness effects (DFEs). We are able to find the DFEs through the use of deep mutational scanning, which uses saturation mutagenesis, high throughput screens, and deep sequencing to study the impact of mutations on a given proteins function. In this moment of time, we have developed a site saturation mutagenesis library and we are screening all of the point mutants for Ami-E with in a growth selection condition. From there we can quantify which variant does better or worse using deep sequencing allow us to generate DFEs from that data. After the high throughput screening and growth selection is complete, we are able to then progress forward to generating another mutant library, preform selection and analyze them, ultimately allowing for the determining of the DFEs for the destabilized variant Ami-E and determine what fits it. And hopefully allow us to predict a relationship between number of positive mutations and stability.

CRYSTAL GROWTH OF THERMOELECTRIC MATERIALS
Mack Marshall (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 1, 1:00 PM - 2:15 PM
Poster: 209
Mentor(s): David Smiadak (Chemical Engineering & Materials Science), Alex Zevalkink (Chemical Engineering & Materials Science)

Thermoelectric materials are a field of growing interest due to their potential applications in waste heat recovery and as scalable cooling and heating elements. These materials convert temperature gradients into electricity, or vice versa, in an efficient enough manner to harness these products. A material's thermoelectric efficiency is usually represented by its figure of merit: $zT = \frac{\alpha^2 \sigma T}{K}$, where σ is the electrical conductivity, T is the temperature, K is the total thermal conductivity, and $\alpha$is the Seebeck coefficient. The main challenge in creating commercially viable thermoelectric materials, therefore, is optimizing the intrinsically contradictory material properties of thermal and electrical conductivity in order to improve efficiency. This makes compounds with anisotropic crystal structures especially intriguing, as anisotropic properties may provide a way to decouple the Seebeck coefficient from the electrical conductivity of a material. However, it is nearly impossible to determine the effect of anisotropy of these compounds within a polycrystalline sample. The need for single crystals of the Zintl compound of focus – $Ca_5M_2Sb_6$ (M=Al, Ga, or In) – is being addressed through the synthesis of pure-phase material, and subsequent flux growth of crystals from those samples, that can later be translated into the travelling solvent floating zone growth of large (cm scale) directional single crystals for testing transport properties.

CREATING NOVEL LUMINESCENT COMPOSITE MATERIALS WITH ENHANCED MECHANICAL PROPERTIES BY DISPERSING SILICON NANOCRYSTALS WITHIN POLYDIMETHYLSILOXANE
Andrew Millar (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 2, 1:00 PM - 2:15 PM
Poster: 212
Mentor(s): Rebecca Anthony (Mechanical Engineering)

Silicon-based organic polymers, known as silicones, give way for interesting technologies such as wearable electronics, highly compatible biomedical devices, and stretchable solar cells to become realities. Improving the properties of silicones would inevitably lead to enhancing the performance and versatility of cutting-edge technologies that incorporates them. Focusing specifically on one silicone, polydimethylsiloxane(PDMS), it is hypothesized that by dispersing functionalized silicon nanocrystals within PDMS, the resulting composite will have improved elastomeric mechanical properties due to reduced cross-linking sites available during PDMS synthesis. For creating the composites required to test this, hydrogen terminated silicon nanocrystals are first created via an all-gas phase, non-thermal plasma reactor. Silane gas supplies the silicon for the nanocrystal while argon is simultaneously fed into the reactor as a carrier gas and source of electrons for the chemical reaction. Hydrogen gas caps the silicon nanocrystal surfaces, satisfying dangling bonds left over from the reaction. These nanocrystals are surface-functionalized by implementing liquid-phase organic chemistry techniques within an air-free environment using a schlenk line. We chose 1-dodecene and 1-octadecene as functionalizing ligands to probe the effects of alkyl chain length on the mechanical properties of the resulting PDMS/nanocrystal composites. These functionalized nanocrystals were resuspended, dispersed within a pre-polymer solution, cured, and cooled. The optical properties of the composites were characterized using photoluminescence spectroscopy, and we measured the mechanical behavior of the composites using uniaxial tensile testing. Our future work will employ a homogenization model to understand how altering the surface of silicon nanocrystals impacts the elastomericity of the composite.

SYNTHESIS AND LCST STUDIES OF CLICKABLE, THERMORESPONSIVE POLY(ETHYLENE GLYCOL) (PEG) POLYMERS
Christopher Peruzzi (Grand Valley State University)
Category & Time: Chemical Engineering and Materials Science, Section 2, 1:00 PM - 2:15 PM
Poster: 213
Mentor(s): James Hsiao (Chemistry), Yu-Ling Lien (Chemistry), Mitch Smith (Chemistry)

In this work, non-degradable propargyl substituted poly(ethylene glycol) (PEG) polymers were prepared via ring-opening polymerization of epoxides. The propargyl functional group on the polymers can then readily be modified via a copper(I)-catalyzed 1,3-dipolar cyclo-addition of azides and alkynes (CuAAC). The final structures of these polymers are thermally tunable, and exhibit a lower critical solution temperature (LCST) in water based on the percentage of hydrophilic and hydrophobic organic azides that participate in the cycloaddition. This unique property of thermally responsive polymers is similar to poly(N-isopropylacrylamide) (PNIPAM) and its copolymers, both of which are widely studied thermoresponsive polymers for biomedical applications. Unlike PNIPAM, which has a well-defined LCST, the clickable PEG polymer LCST can be tuned based on the azide chosen for the click cycloaddition, thus covering a much wider range of temperatures than PNIPAM for broader application. The ease of post-polymerization modification via CuAAC allowed for a series of polymers to be synthesized with varying amounts of hydrophilic, hydrophobic, and charged organic azide groups, and thus varied properties. Additionally, these amphiphilic polymers can form unimolecular micelles, which can act to solubilize organic small molecules in aqueous media as well as stabilize proteins in aqueous and organic media. In this work, the synthesis and LCST of polymers baring hydrophilic, hydrophobic, and charged side chains will be presented.

REMEDIATION OF NITROGEN AND PHOSPHORUS IN WASTEWATERS
Luis D Rivera Cubero (University of Puerto Rico Aguadilla)
Category & Time: Chemical Engineering and Materials Science, Section 2, 1:00 PM - 2:15 PM
Poster: 214
Mentor(s): Cory Ruzinek (Center for Coating and Diamond Technology), Greg Swain (Chemistry)

Anaerobic digestion (AD) is a technology used to treat organic waste and produce renewable energy and other value-added products. The anaerobic digestion effluent has relatively high levels of biological oxygen demand (BOD), chemical oxygen demand (COD), and nutrients (nitrogen and phosphorus). Nitrogen and Phosphorus cause problems in anaerobic digestion because of their metabolic products. They cause many water quality problems such as possible lethal effects of algal toxins on drinking water. Electrochemical treatments can be used for the removal of organic and inorganic pollutants from fresh, drinking and waste waters. The method consists of carrying out direct or indirect oxidation at an anode where pollutants are converted into less harmful substances. Dimensionally stable anodes are needed for these remediation processes and boron-doped diamond (BDD) is one such electrode that shows great promise. BDD offers a wide electrochemical potential window in aqueous solutions and excellent microstructural and morphological stability at extreme currents and potentials. Additionally, the electrode can function to directly oxidize contaminants or be used to produce a variety of oxidants (e.g., OH radical) that can attack contaminants. It is a suitable material for many applications including: bioelectrochemical applications, electroanalytical applications, water analysis, water disinfection and water and waste water treatment. In this presentation, the properties of BDD will be discussed and examples given of how effectively the anode can be used to remediate nitrogen and phosphorous from digestates.

A HANDS-ON, SMALL-SCALE CHEMICAL ENGINEERING DEMO
Scott Romberger (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 2, 1:00 PM - 2:15 PM
Poster: 215
Mentor(s): Maddalena Fanelli (Chemical Engineering & Materials Science)

The current project focuses on developing a small-scale, continuous liquid-liquid extraction experiment using materials readily available to inquiring students. A portable and relatively safe setup can give students and the community a better understanding of chemical engineering principles related to liquid-liquid extraction, mass transfer and separation. A syringe pump containing a colorless aqueous phase and a peristaltic pump containing a pigmented oil phase pump the fluids through a mixing tube, where contacting between the liquids leads to extraction of the color pigment from the oil into the aqueous phase. The mixed fluids pass through a compact separation unit to recover a colored aqueous extract and the oil raffinate. The current work is a preliminary step towards the development of a multi-stage separation experiment.

ANALYZING THE DEGRADATION OF CELLULOID, THE FIRST SYNTHETIC POLYMER
Montgomery Smith (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 2, 1:00 PM - 2:15 PM
Poster: 216
Mentor(s): Per Askeland (Chemical Engineering & Materials Science)

In this experiment, Scanning Electron Microscope technology will be utilized to analyze the surfaces of celluloid and a metal before and after the occurrence of a reaction between the two. As celluloid and metal interact and react in an isolated area the celluloid slowly begins to weaken and “crumble” while releasing a phenolic gas; The metal simultaneously oxidizes overtime. This project involves the analysis and characterization of celluloid and metal to determine the physical alterations caused by the observed chemical decomposition. Through the application of EDS (Energy Dispersive X-ray spectroscopy) via the SEM in addition to analyzing physical characteristics of the reaction, this project should allow for the simplification of the actual decomposition or chemical change occurring via the reaction. While celluloid is only one example of synthetic polymers, understanding the reaction that occurs between itself and metal can aid in the understanding of the reactive nature of other synthetic polymers and allow for counter-active production and development of new polymers to avoid the same result over time.

SYNTHESIS OF LEAD FREE PEROVSKITE NANOCRYSTALS AND THEIR APPLICATION IN THIN-FILM OPTOELECTRONIC DEVICES
Zach Smith (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 2, 1:00 PM - 2:15 PM
Poster: 217
Mentor(s): Richard Lunt (Chemical Engineering & Materials Science), Lili Wang (Chemical Engineering & Materials Science)

The development of a cheap, efficient, and environmentally benign semiconductor materials can revolutionize the production of solar cells and LEDs. Presently, lead-based halide perovskites are among the most promising materials for next generation photovoltaics, with solar conversions reaching 22% within the past 8 years, but their toxicity restricts their commercialization. Double perovskites and 2-dimensional perovskites provide more flexibility in elemental substitution and band gap tuning and have been identified as possible replacements for lead-based devices due to their low toxicity and high stability. To explore the properties of these materials in depth, synthesis by wet chemical methods of double perovskite and 2-dimensional perovskite materials were conducted by adjusting concentration, temperature, and reaction time. The template molecules provide functional groups that serve as a protective layer around these materials that can prevent individual sheets of products from aggregating, which allows precise tuning of morphology and band gap. The crystal structures of as-synthesized monodispersed nanocrystals were measured by x-ray diffraction (XRD) and optical properties were studied by absorption and photoluminescence spectroscopy. Synthesized nanocrystals with the most promising properties will be further investigated in thin-film devices such as photovoltaic cells and LEDs.

BIOACTIVE AND ANTIBACTERIAL COATINGS OF METAL SUBSTRATES
Logan Soule (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 3, 2:30 PM - 3:45 PM
Poster: 220
Mentor(s): Xanthippi Chatzistavrou (Chemical Engineering & Materials Science), Natalia Pajeres Chamorro (Chemical Engineering & Materials Science)

There is an urgent need for increasing the longevity of prosthetic implants to avoid subsequent surgeries that replace implants when they become infected, degrade, or shift from their proper location. Although metallic alloys are durable, and mechanically strong, they are often bioinert, and lack antibacterial properties. Recently, a possible solution was considered involving the replacement of the metallic implants by bioactive glass 3D-scaffolds. However, these 3D-glasses are often too brittle and susceptible to breaking under the application of load. This study attempts to create crack-free, homogeneous bioactive glass coatings on metal substrates that are both bioactive and antibacterial while retaining mechanical strength. Titanium alloy samples and 316L stainless steel discs were used as substrates and were coated using a spin coater. Coating parameters mainly included the volume of the solution, the rotation speed, and the duration of rotation. The 58S bioactive glass was prepared using a sol-gel (solution-gelation) technique. Different pretreatment methods of the substrates were implemented to improve bonding ability and reduce cracking. The coatings were characterized using SEM, FTIR, XRD, and other methods. Bioactivity has been tested through soaking in Simulated Body Fluid (SBF). Antibacterial properties will be studied against *Staphylococcus aureus* after modification to a more complex glass composition that includes silver ions. This study is a foundation for the development of

coated prosthetics in the biomedical field that can reduce successive implant replacement and lead to a new generation of strong antibacterial and bioactive coatings.

STEP ISOTHERM RESEARCH FOR ACTIVATED CARBON FOR WATER ADSORPTION/DESORPTION ANALYSIS
Dylan Spruit (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 3, 2:30 PM - 3:45 PM
Poster: 221
Mentor(s): Eva Almenar (Packaging)

Understanding water adsorption in porous materials is important for the development of novel packaging. Modified humidity packaging is a type of active packaging that alters the in-package relative humidity by using specific compounds that can either absorb or adsorb water molecules. Currently, there is a multitude of porous materials with the potential to regulate in-package humidity and therefore, to be used for development of modified humidity packaging. However, the sorption/desorption curves conducted under the conditions that packaged food is currently stored have yet to be established. The objective of this study was to investigate the water sorption/desorption capability of one of the compounds with porous structure, activated charcoal, using a step-isotherm test at 5 °C, 10 °C, and 23 °C. 50 mg of compound underwent three repetitions per temperature variable. The SGA-100 Symmetrical Thermogravimetric Analyzer System is used to collect the step-isotherm curves. The results show that activated charcoal had the highest sorption capacity at 23 °C with a weight increase of 38%. At 23 °C, activated carbon also experienced the quickest run-time. At 5 °C and 10 °C, the porous material displayed minimal difference to sorption capacity with a weight increase of only 30%, however, at 5 °C the compound experienced the slowest sorption/desorption time.

TENSILE STRENGTH IN 3D PRINTED POLYLACTIC ACID
Dalton Stetsko (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 3, 2:30 PM - 2:30 PM
Poster: 222
Mentor(s): Ramani Narayan (Chemical Engineering & Materials Science)

(Poly)lactic acid (PLA) is a commonly used material in 3D printing. The PLA extruded from the 3D printer cools very quickly, resulting in a low crystallinity that directly affects the strength of the material. Often, 3D printed parts are not printed with 100% density in order save both time and raw material. However, this compromises the strength of the part. The density is adjusted using the following variables; percent infill*, shell thickness, and infill print pattern. In this study, the effect of an annealing process to increase crystallinity and a variable percent infill on the tensile strength of the part was tested. The heat treatment annealing process resulted in an increase in crystallinity that improved the modulus of elasticity significantly at infills greater than 10%. The modulus of elasticity also increased with percent infill in both heat-treated and not heat-treated parts. The rate at which the modulus of elasticity increased did so with the percent infill. *Percent infill is the percent of the volume of the part that is filled with material.

PARAMETERIZING THERMODYNAMIC MODELS USING INFRARED SPECTROSCOPY
Jackson Storer (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 3, 2:30 PM - 3:45 PM
Poster: 223
Mentor(s): Aseel Bala (Chemical Engineering & Materials Science), William Killian (Chemical Engineering & Materials Science), Carl Lira (Chemical Engineering & Materials Science)

In industry, chemical separation processes are expensive to develop and operate. There is a need for thermodynamic models that can accurately represent multicomponent liquid-liquid equilibrium (LLE) and vapor-liquid-liquid equilibrium (VLLE) curves for industrial important, associating systems. This will accelerate the concept-to-application timeline for these processes. With rising interest in the development of chemicals and fuels from bio-based sources (which contain many hydrogen bonding components), it is becoming especially important to accurately model these phenomena while minimizing the number of adjustable parameters. In developing new thermody-namic models, there are two additional aspects that need to be leveraged to improve the parame-terization of these models: spectroscopy and simulations. During this research project, binary mix-tures of alcohols and hydrocarbons, at varying concentrations, were analyzed using Fourier Trans-form Infrared (FTIR) spectroscopy, gas chromatography (GC), and Karl Fischer titration tests. An algorithm was also developed to deconvolute the FTIR spectra. The fitted peaks were assigned to the possible bond species, α, β, γ, and δ. This data was used to determine the fraction of these species existing in equilibrium in each mixture. From these fractions, we will be able calculate the association strength, Δ. This will allow us to better parameterize our model, in turn increasing its accuracy and our understanding of hydrogen bonding.

EVALUATION OF CRYSTALLIZATION KINETICS FOR POLYLACTIDE
Clayton Threatt (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 3, 2:30 PM - 3:45 PM
Poster: 224
Mentor(s): Ramani Narayan (Chemical Engineering & Materials Science)

Polylactide (PLA) is a biobased polymer that is used in various commercial applications including packaging and biodegradable injection-molded commodity items. For almost all commercial applications, it is important to optimize both the processing time as well as the mechanical properties of the final product, thus, improving its cost-effectiveness. The mechanical properties of a PLA product are strongly dependent on the percent crystallinity of the processed PLA, which is, in turn, dependent primarily on the optical purity of the base resin, and the type of processing and post-processing carried out on it. The post-processing method used in these experiments was thermal annealing. 3001D and 3100HP are two common grades of PLA that are supplied by Natureworks LLC., with 3100HP being the faster

crystallizing grade of the two. Under identical annealing conditions it is expected that 3100HP grade PLA will not only result in a higher percent crystallinity, but it will also be achieved at a shorter cycle time as compared to 3001D at a given annealing temperature. The effects of the addition of 5% by weight of a nucleating agent - Poly(D-lactide) or PDLA, to 3001D PLA, were also studied. The addition of the nucleating agent is expected to reduce the amount of time required for crystallization to complete without compromising the maximum crystallinity of the product. The results of these experiments will provide insight into ideal cycle times and temperatures for annealing these two different grades of PLA, with and without the addition of a nucleating agent.

BIO-BUTANOL PRODUCTION USING CONTINUOUS CONDENSED-PHASE GUERBET REACTIONS
Jason Zak (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 3, 2:30 PM - 3:45 PM
Poster: 225
Mentor(s): Dennis Miller (Chemical Engineering & Materials Science), Iman Nezam (Chemical Engineering & Materials Science)

With the increased need to develop renewable energy sources, bio-ethanol has become popular as a fuel alternative. Since butanol's properties are more similar to gasoline, the production of bio-butanol has been investigated as a replacement to bio-ethanol. There has been ongoing research in the production of bio-butanol from bio-ethanol using the Guerbet reaction pathway, but an ideal catalyst that optimizes the butanol production has yet to be discovered. In this work, the effect of catalyst composition, surface properties, and reaction conditions on the butanol selectivity and ethanol conversion for Guerbet reactions has been studied. The desired outcome of the research is to discover a catalyst that produces C4+ alcohols selectivity above 90%. Experiments are conducted using a condensed-phase continuous flow reactor with ethanol flowrates varying from 0.5-1.5 mL/s at temperatures ranging from 200-250 K. The catalysts used in these experiments are metallic and bimetallic catalysts that have been observed to have desirable surface properties and activity in several experiments in our research group and the in literature. The amount of active acidic and basic sites on the catalyst surface is measured through Temperature Programmed Desorption (TPD) analysis, and nitrogen BET adsorption analysis is used to determine the catalyst surface area and porosity. The liquid and gas product streams are analyzed using gas chromatography, liquid chromatography, and Karl-Fischer titration.

ENZYMATIC HYDROGEL FILM THICKNESS OPTIMIZATION USING AFM
Yujia Beryl Zhang (Michigan State University)
Category & Time: Chemical Engineering and Materials Science, Section 3, 2:30 PM - 3:45 PM
Poster: 226
Mentor(s): Scott Calabrese Barton (Chemical Engineering & Materials Science), Alex Mirabal (Chemical Engineering & Materials Science)

Substrate channeling efficiently enables direct transport of intermediates from one active site to another in cascade reactions. [1] Under the liquid condition, substrate channeling can occur at distances up to 10 nm in nature, keeping high local concentration by minimizing diffusion to the bulk environment. [1] AFM with scanning electrochemical microscopy (SECM) enables simultaneous topographical and electrochemical imaging in three-dimensional surface profile in a liquid environment at nanoscale resolution. Hydrogel films can hold an enzyme stationary on the surface in order to be detected by AFM. [3] The objective of this study is to optimize the thickness of hydrogel films by varying factors, which enables the detection of the enzyme in hydrogel films by AFM - SECM. Factors that affect the thickness of hydrogel films such as time, the concentration of crosslinker solution and technical application can be considered. Bioactive films containing hydrogels and enzyme are prepared on flat surfaces, then AFM was used to locate the enzyme glucose oxidase (~14 nm). [4]

CIVIL AND ENVIRONMENTAL ENGINEERING

REPURPOSE WOOD: A FEASIBLE ALTERNATIVE FOR MANUFACTURING CROSS LAMINATED TIMBER PANELS
Darius Bates (Jackson State University)
Category & Time: Civil and Environmental Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 230
Mentor(s): George H Berghorn (Construction Management), Pascal Nzokou (Forestry), Chad Papa (Forestry)

This study is aimed to demonstrate feasible alternatives for manufacturing CLT panels made of wood repurposed from deconstruction of buildings. Salvaged wood will be the primary core component and clear wood species as a surface layer for CLT panels manufactured in this project. A factorial experimental design with 4 species-mixture combinations and 3 resin formulations (one-component polyurethane, Phenol-resorcinol formaldehyde, and Emulsion Polymer Isocyanate) will be used for experimentation. The species combination will include 2 core species (both softwood), and 2 surface species (one softwood and one hardwood). All CLT boards will have 5 layers, including 3 core layers made with repurposed wood and 2 surface layers made with clear wood. One control set of 5-layers comprised of clear wood will be made and tested for comparing results. Panel testing will be in accordance with ANSI/APA PRG 320-2012, Standards for Performance-Rated Cross-Laminated Timber, and will include measures of maximum resistance, bonding, and delamination.

PARKING GUIDANE SYSTEMS
Alexander Cressler (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 231
Mentor(s): Mehrnaz Ghamami (Civil & Environmental Engineering)

Limited parking spaces are one of the main challenges in high density areas. People can spend 10 to 20 minutes looking for a parking spot. There are variety of technologies available to count the available parking spots and provide that information to the users. This would help significantly reduce search times, facilitate traffic flow, reduce fuel consumption and emissions, and increase the parking revenue. This study aims to consider these different technologies and chose the best strategy for a university campus with covered and open parking lots. There are currently a few companies that install parking guidance systems across the world and have a few variations on the best way to do so. The basic concept is that the system detects whether a spot is open and then relay the information to those looking to find a spot. Various detection methods available today include induction loops, magnetic sensors with infrared cameras, ultrasonic detectors, microwave emitters, and cameras with image processing. Each of these methods have their own merits and limitations and there is no one best solution for all lots. Standard gate counting, is a low cost strategy, but provides no information on the location of open spots. The most cost effective solutions are ultrasonic detectors for indoor lots and magnetic sensors with infrared cameras for outdoor lots. More accurate versions include the microwave emitter and the induction loops. The cameras with image processing provide a larger variety of applications with possible addition of license plate recognition or security footage.

ELECTRIC VEHICLE FAST CHARGING STATION ENERGY DEMAND PROFILE
Kelsey Goss (Michigan State Univerity)
Category & Time: Civil and Environmental Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 232
Mentor(s): Annick Anctil (Civil & Environmental Engineering)

Electric Vehicle (EV) technology, including Lithium-Ion Batteries (LIBs), has advanced significantly over the past decade. Just as the internal combustion engine, growth of the EV market hinges on the available opportunities for drivers to recharge. One promising option amongst EV drivers is Fast Charging Stations (FCS), where recharging may take place in under 30 minutes. To assure preservation of resources and limit emissions, it is proposed that used EV batteries be repurposed and implemented into an Energy Storage System (ESS) at an FCS, where they'd be charged from Photovoltaic (PV) cells and discharged to refuel an EV. The size of the ESS necessary at various locations depends on factors including the expected daily energy demand that is requested from the FCS. Any ESS and PV used at an FCS must be designed for the predicted peak demand. A model was built using MATLAB and Simulink to perform a Monte Carlo simulation producing a daily energy demand profile which considers driver habits, temperature effects, distances traveled, EV penetration, and EV energy consumption in the city of Detroit, Michigan. Incorporating renewable sources into the grid in Detroit, where majority of energy is produced from high pollution sources, would alleviate much more global warming impact than in cities where more energy is generated from renewables. The model determined that peak demand, which is greatly influenced by temperature effect on battery capacity, will occur in the evening and future EV advancement should focus on effect of thermal management to control it.

DYNAMIC TRAFFIC ASSIGNMENT: STATIC CONVERSION AND CALIBRATIONS BASED ON STATE-WIDE MICHIGAN AND SEMCOG NETWORK CASE STUDIES
Laura Hohnstadt (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 233
Mentor(s): Ali Zockaie (Civil & Environmental Engineering)

The objective of this research is to develop a comprehensive procedure that converts a static traffic assignment model to a dynamic traffic assignment model. Previous research has exposed the need for improved traffic assignment methods; this paper analyzes previous methods and the advantages of each new method, culminating in the dynamic model whose time-based union of real-time data and a static model makes it the most accurate and detailed model. The time-dependent element of the dynamic model lends itself to a realistic simulation which accurately captures many elements of travel throughout a given time period. This research focuses on the methodology of generating such a model by converting a static model to a dynamic format, then calibrating that model based on actual data observed in real life. Widespread use of dynamic models will greatly improve traffic modeling and forecasting; with its versatility, it allows for a better understanding of the effects of weather, road quality, different modes of transportation, and construction. The ability to elegantly alter these effects bolsters the potential to create and improve traffic networks that minimize congestion, travel times, and emissions. This study focuses on the conversion of a static state-wide Michigan network and a SEMCOG network to dynamic models and the calibrations of the state-wide model.

STATUS-RELATED SOCIAL STRESS ALTERS REWARD CIRCUITRY GENE EXPRESSION
Emily Kawka (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 234
Mentor(s): Alison Cupples (Civil & Environmental Engineering), Jean-Rene Thelusmond (Civil & Environmental Engineering)

Triclocarban (TCC) is an antimicrobial used in personal care products, such as deodorants, soaps, and toothpaste. Due to its incomplete removal in wastewater treatment plants, TCC is appearing more frequently and at higher concentrations in agricultural soils because of biosolids application and irrigation with wastewater effluents. This is an area of concern given that TCC has the potential to bioaccumulate in crops and produce resistant microbial communities in soil. Degradation by microbial communities may be a potential solution to remove

TCC from agricultural soils with minimal financial and environmental impact. This study investigates the degradation of TCC by microbial communities in agricultural soil through measuring the concentration over time. In the experimental procedure, microcosms were placed in serum bottles using 5 grams of soil spiked with 250 ng of TCC in each bottle. Both the samples and the abiotic controls were then incubated and monitored regularly. To measure the concentration, the methods used were a modified QuEChERS approach to extract the chemical, solid-phase extraction to purify the extract, and liquid chromatography-electrospray tandem mass spectrometry to quantify the concentration of TCC present. In analyzing the data, a change in concentration between the biotic and abiotic samples will indicate whether degradation occurred due to the microbial communities. Based on previous studies, TCC has the tendency to persist in soil although in using different soils with different microbial communities and having a longer exposure in soil, there is potential for an increase in degradation.

URINE TO FERTILIZER REACTOR AND NANOCHROMATOGRAPHY MONITORING
Jeffery Lorencen (Michigan State University), Emily Drake (Michigan State University), Olivia Sinutko (Michigan State University), Ruiwei Sui (Michigan State University), Zoe Wilton (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 235
Mentor(s): Rebecca Lahr (Civil & Environmental Engineering)

A urine diversion reactor has been built to harvest N and P from human urine. Nanochromatography, a new method of nutrient monitoring, is being used to measure nutrient concentrations of different reactor effluents. Nanochromatography is an inexpensive and simple method, using only a drop of water, a mirrored slide, a jeweler's loop, and a cell phone camera. The method relies on the coffee ring affect to create unique and reproducible "fingerprints" for each unique solution. Standard curves of nanochromatography images have been produced, and residue patterns attributed to N, P, and Mg. The reactor removes N and P by precipitation, and ion exchange. First, the aged urine is spiked with Mg, and struvite(NH3MgPO4*6H2O) precipitates and is filtered out. Next, the urine passes through a zeolite filter, which captures the remaining ammonium while releasing sodium in a 1:1 ratio. Nutrient concentrations were measured by comparing nanochromatography standards to images of the urine after each stage in the reactor.

SOCIAL AND POLICY FACTORS AFFECTING ELECTRIC VEHICLE CHARGING INFRASTRUCTURE EXPANSION
Eric Matynowski (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 238
Mentor(s): Sharlissa Moore (James Madison College)

Electric vehicles (EV) have slowly been gaining a foothold in the automotive market share; however, there are concerns with range anxiety and a lack of infrastructure to support electric vehicles. One means of increasing range is to implement wireless charging units under roadways to allow for charging while driving. A second is to develop a network of DC fast chargers where drivers can stop to charge in 20-75 minutes. The goal of this research is to examine the social and political factors that will affect the feasibility of roadway charging compared to DC fast chargers, and to integrate these factors into lifecycle assessment and transportation modeling through interdisciplinary research. The research question is: how can electric vehicle charging infrastructure be scaled up in the most socially, environmentally, and technologically feasible manner? It's important that the social and political factors of these charging technologies be studied early in the technological design process when the technology can be more easily redesigned, to facilitate widespread adoption. This research surveyed U.S. electric vehicle owners (n=283), and the general U.S. public (n=467+) to gauge user and public perceptions of new charging technologies and to understand users' charging behavior. In addition, interviews were conducted with expert stakeholders, including engineers, energy policy analysts, government officials, and nonprofit organizations. These results will be utilized in a lifecycle assessment and in transportation modeling. Preliminary results suggest that the key policy issues include: the role utility companies versus other companies should play in scaling up charging infrastructure, safety, and cost.

MOBILITY IMPACTS OF ON-ROAD WIRELESS CHARGING FOR ELECTRIC VEHICLES
Mitchell Morin (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 239
Mentor(s): Mehrnaz Ghamami (Civil & Environmental Engineering)

Dynamic Wireless Charging for electric vehicles (EV) is a promising solution to the range limitations of current electric vehicles. The key to developing supporting infrastructure for wireless charging is proper modeling of public use in large-scale urban networks. This study investigates the impacts of installing on-road wireless charging on the users' route choice and travel pattern and advancement in network mobility (speed and flow). The User Equilibrium (UE) model introduced in 1952 has been used extensively to model changing traffic situations with individual convenience. The standard model assumes users on a network will take the shortest feasible path to travel from their origin to their destination and iterates to incorporate changing traffic flow until the network reaches equilibrium. With this model in mind, a three-route network within Chicago metropolitan area is designed as the case study with both dynamic charging infrastructure and static fast charging facilities currently in place. The goal of this study is to provide insight into the impacts of dynamic charging on the route choice and as a result on the travel time of miscellaneous users. The result of the user equilibrium model will indicate the extent of improvement wireless charging infrastructure will have on EV users and give suppliers an idea of how heavily to invest in the new technology.

A SIMPLIFIED APPROACH FOR MONITORING BURMESE PYTHON IN THE FLORIDA EVERGLADES BY ISOTHERMAL AMPLIFICATION OF EDNA.
Rodney Rackley (University of Central Florida)
Category & Time: Civil and Environmental Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 240
Mentor(s): Syed Hashsham (Civil & Environmental Engineering), Robert Stedtfeld (Civil & Environmental Engineering), Tiffany Stedtfeld (Civil & Environmental Engineering), Hassan Waseem (Civil & Environmental Engineering), Maggie Williams (Civil & Environmental Engineering)

The Burmese Python (Python bivittatus) is a species of Python native to India and southeast Asia. During the last quarter century, these snakes have been imported to Florida as pets where they were released into the environment either by accident or purposely. Now the Burmese Python has infested Southern Florida, including the Florida Everglades, and as their population grows they have threatened local wildlife populations including the endangered key largo woodrat (Neotoma floridana smalli) and the limpkin (Aramus guarauna). Monitoring the range and population of the Burmese Python is important to prevent its continued spread throughout Florida. Traditional monitoring techniques such as tracking and visual surveys are quite ineffective due the Burmese Python's cryptic nature. The focus of this research is to evaluate if environmental DNA (eDNA, the extracellular DNA released from an organism into their environment)-based field monitoring using genetic markers specific to Burmese Python can complement traditional monitoring methods for Burmese Python. The approach will be based on analysis of water samples using isothermal amplification of markers specific to Burmese Python DNA. Primers specific to cytochrome b (cytb) have already been designed using Primer Explorer Ver 4, theoretically evaluated for specificity using BLAST, and ordered from Integrated DNA Technologies, Inc for this purpose. Acquisition of Burmese Python DNA as positive control is also being pursued. Once developed and validated, monitoring of Burmese Python could be carried out more easily and rapidly using field-deployable instruments e.g., Gene-Z which is already being used for other markers.

QUANTIFYING HEAVY METALS IN TAP WATER USING NANOCHROMATOGRAPHY AND IN-SYRINGE SOLID PHASE EXTRACTION
Alyssa Sanderson (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 241
Mentor(s): Rebecca Lahr (Civil & Environmental Engineering)

Currently, methods to detect lead and copper in water are neither low-cost nor user friendly. Nanochromatography methods are under development for low-cost analysis of elements in tap water. Nanochromatography makes use of the physics of the coffee ring effect, along with inexpensive materials, such as a jeweler's loupe ($18), a common cell phone, and aluminum substrates, to produce specific patterns that correspond to elements found in tap water. Tap water samples were analyzed by nanochromatography before and after spiking with copper at the national secondary drinking water standard maximum contaminant level (1.0 mg/L), and differences in the patterns were identified. Lead occurs at much lower levels in tap water than copper. Thus, nanochromatography alone is unsuitable for the detection of lead. However, solid phase extraction (SPE) can be used to preconcentrate the lead before analysis. Once a water sample containing lead is preconcenterated, nanochromatography can be used for analysis. In order to ensure this analysis will not be costly, the SPE method used in this study involves low-cost plastic syringes and Chelex-100 resin. It is expected that it will be possible to quantify lead in water at a level of 15 ppb or higher using in-syringe SPE and nanochromatography.

AN ECONOMIC ANALYSIS OF POTENTIAL END-OF-LIFE PATHWAYS FOR ELECTRIC VEHICLE BATTERIES
Taylor Stephen (University of Maryland Baltimore County)
Category & Time: Civil and Environmental Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 242
Mentor(s): Annick Anctil (Civil & Environmental Engineering), Dipti Kamath (Civil & Environmental Engineering)

One of the greatest barriers of large-scale market penetration of electric vehicles (EVs) is the high cost in comparison to internal combustion vehicles. This cost difference is due, in part, to the lithium-ion batteries (LIBs) utilized in EVs. One way of reducing the cost of EVs is to reduce that of LIBs which are an expensive technology. The goal of this project is to analyze the different end-of-life (EOL) options for EV batteries in a closed-loop system and determine the potential impact on the initial cost of the LIBs and therefore the cost of EVs. There are two pathways considered in this study. Pathway (1) follows that EOL EV batteries are recycled, and recoverable materials replace virgin materials in the beginning of the closed-loop system. Pathway (2) follows that viable EOL EV batteries are repurposed for stationary energy storage applications, and after their second-life, the repurposed batteries as well as the batteries unable to be repurposed follow pathway (1). The economic impact of each pathway on the original cost of EV batteries is determined through extensive literature review, consideration of life-cycle data collected in the lab, and analysis of the impact of policy on the feasibility of each pathway. Preliminary results suggest that pathway (2) provides the most savings for EV customers. These savings could become more feasible given the implementation of regulatory and incentive policy for several aspects of this pathway including ownership rights of the batteries and recycling mandates.

ANALYSIS OF URINE SOLUTIONS USING NANOCHROMATOGRAPHY
Zoe Wilton (Michigan State University), Jeffery Lorencen, (Michigan State University), Ruiwei Sui (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 243
Mentor(s): Rebecca Lahr (Civil & Environmental Engineering)

Urine diverting rectors are being installed all around the world in low resource areas to collect source-separated human urine and recover the nutrients as fertilizer; the technology for monitoring reactor function with analytical chemistry is often lacking due to time or cost constraints. A new low-cost and user-friendly method was created to monitor the concentrations of ammonium, phosphate, and magnesium in urine diverting reactors. This new method only requires a jeweler's loop, cell phone camera, and aluminum slides to harness the coffee ring effect as it creates unique residue patterns when droplets of liquid solutions dry. The unique patterns can be used to determine the type and amount of dissolved nutrients in solution. These patterns are being analyzed using particle analysis in the open source software ImageJ to establish correlations between features in the residue patterns and concentrations of nutrients. The composition of synthetic urine solutions were modified to determine how the residue patterns change with each component of the urine solution, so that concentrations of nutrients could be determined for each stage of a urine to fertilizer reactor.

ENVIRONMENTAL IMPACTS OF ON-ROAD WIRELESS CHARGING VERSUS PLUG-IN CHARGING STATIONS
Siqi Xue (Michigan State University)
Category & Time: Civil and Environmental Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 244
Mentor(s): Annick Anctil (Civil & Environmental Engineering), Dipti Kamath (Civil & Environmental Engineering)

Carbon dioxide (CO2) is a major greenhouse gas in the U.S., and about 27% of emission comes from transportation as reported in 2015. In reducing CO2, electric vehicles (EVs) are good alternatives for conventional internal combustion engine vehicles (ICEV). EVs can be charged wirelessly or using plug-in charging stations. Wireless charging has a slightly lower efficiency (85%) than plug-in charging (90%). As EVs do not have to stop for charging, on-road wireless charging can increase the cruising range. On-road wireless charging does not require changing itinerary to find a charging station and wait time for charging. It could increase the number of EV users. In order to compare the environmental impacts of installing on-road wireless charging to the plug-in charging station, life cycle assessment (LCA) is applied. The functional unit is charging all EVs for 10 years in a city similar to Chicago. Stages that are considered include material extraction, manufacturing, construction, and use phase. On-road wireless charging model consists of roadbed primary coils and secondary coils on EVs, DC/AC inverter, and other components that are connected to the grid. Full lane reconstruction is used to construct the wireless charging strips. Plug-in charging stations are based on commercially available DC fast chargers. Impact categories considered are cumulative energy demand (CED), greenhouse gas (GHG), and material depletion.

COMPUTER SCIENCE AND ENGINEERING

THE EFFECTS OF THE STABILITY ASSUMPTION ON K-MEANS++
Alexandra Camero (University of Central Florida)
Category & Time: Computer Science and Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 248
Mentor(s): Hu Ding (Computer Science & Engineering)

The k-means method is popular algorithm used for solving the k-means clustering problem. The goal of the k-means problem is to minimize the average squared distances between the center of a cluster and its points. In k-means, this is achieved by randomly choosing k initial cluster centers that will then be iteratively relocated until they reach the goal of the k-means problem. However, because of its initial randomness, it is known that k-means is sensible to its initialization, meaning that the performance of the algorithm is affected by what k centers are chosen at the beginning. A common approach used to address this problem is k-means++, our focus for this research. Unlike k-means, the k-means++ algorithm only chooses one random center with the rest of the centers being selected depending on what centers have already been chosen. Although this approach is faster and more accurate than k-means, k-means++ has been shown to be inefficient on large datasets due to the amount of time it takes to choose its k initial centers. This is undesirable as the usage of large, real-world datasets is becoming more frequent. Different approaches have been taken to improve k-means++, each with their own weaknesses and strengths. In our research, we look to improve k-means++ by using the stability assumption. We hope that our results will either improve k-means++ by either reducing its runtime or approximation ratio.

IRIS PRESENTATION ATTACK DETECTION
Charles Carroll (Michigan State University)
Category & Time: Computer Science and Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 249
Mentor(s): Arun Ross (Computer Science & Engineering)

There are various ways one might try to fool an iris recognition system by presenting fake or modified data. For example, one can imprint valid iris data on a cosmetic contact lens or on a prosthetic eye. Even printing out a picture of an eye and placing it before the iris scanner has the possibility of generating a false positive, if the picture is generated with the right printer and has sufficiently good resolution. To address this issue, the Iris Presentation Attack Detection (IPAD) team is developing methods that can detect if the input iris data

corresponds to a presentation attack or not. One such method is based on convolutional neural networks (CNNs). The proposed method inputs an image of the eye that is presented to the system. Then it attempts to locate the iris within that image and, if successful, tessellates the segmented iris into 10 sub-images. Each of these sub-images is then input to a CNN which produces a Presentation Attack Score (PA Score in the interval [0,1]). This PA score is then used to determine if the input image is a real iris or not. Experiments are being conducted on several datasets.

DETECTING CODE SMELLS IN JAVASCRIPT APPLICATIONS
Cameron Chambers (Oakland University), Charlie Wingate (Oakland University)
Category & Time: Computer Science and Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 250
Mentor(s): Lunjin Lu (Computer Science & Engineering)

Code smells are poor design choices that, while not necessarily bugs, can negatively impact the quality of an application. After a preliminary search we've identified roughly 22 different types of code smells, each with different degrees of severity and prevalence. Our task is to learn the theories used to model programs, such as Data Flow Analysis, and design a program that will detect those code smells. Rather then building a program from scratch, we will be modifying a static analyzer, Type Analyzer for JavaScript, to detect the code smells.

ATTACK AND COUNTERMEASURES ON PHYSICAL-LAYER SECURITY IN WIRELESS NETWORK
Charles Dana (University of Dallas), Emmanuel Amiewalan (University of Louisiana at Lafayette)
Category & Time: Computer Science and Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 251
Mentor(s): Rui Zhu (Computer Science & Engineering)

Encryption via a secret key has been the traditional mode of ensuring security up through the current day. However, due to the increase in high-performance computing the reliability of traditional key encryption has diminished. The purpose of this research is to examine the physical layer in wireless communication and its security benefits over the previous security methods. Physical security provides a solution that establishes a shared secret over an unsecured communication channel via the wireless medium, that is, broadcast and superposition. The broadcast is the transmission of information sent from one location to the next and superposition is a principle of quantum theory that describes a challenging concept that will be addressed later in detail. Considering these two phenomena, the main idea of physical layer security lies in the symmetric channel between two communicating nodes. Both the sender and receiver observe the same channel condition. With this seminal foundation along with previous tests and data, we set up experiments with Matlab programs to process data, build new machine learning (ML) algorithms, and test the estimation performance to further untapped potential of PHY (physical) layer security.

APPLICATION OF EXTENDED HMM TO PREDICT IOT THREATS
Andrew DeJonge (Oakland University), Miguel Millan (Oakland University)
Category & Time: Computer Science and Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 252
Mentor(s): Ali Alharbi (Computer Science & Engineering), Abdulaziz Alshammari (Computer Science & Engineering), Mohamed Zohdy (Computer Science & Engineering)

As the Internet of Things (IoT) becomes more prevalent in society, security threats continue to arise. Many IoT devices, such as smart cameras and DVRs, are sold with little to no security allowing hackers to use many different types of attacks to compromise either their functionality, or the privacy of their owners. The first step to preventing these attacks is being able to identify patterns which indicate the types of attacks being performed: denial of service (DoS), man in the middle(MITM), Probe, remote to local (r2l), and unauthorized access to root (u2r) are all general types of attacks used to compromise or interfere with IoT devices. As with type, being able to identify the intention behind an attack will also enable more efficient prevention of attacks. In most instances, an attacker will remain hidden, so attacks must be identified based on the traces left behind as the attack occurs. Thus the goal of this research is to apply Hidden Markov Models (HMMs) extended to two dimensions in order to detect the type and intention behind attacks on IoT devices. The next step would then be to effectively apply the extended 2D-HMM to recent threat identification and prediction in IoT.

SPIKE SORTING METHODS FOR STUDYING PLASTICITY SURROUNDING IMPLANTED NEUROPROSTHESES
Matthew Drazin (Michigan State University)
Category & Time: Computer Science and Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 253
Mentor(s): Erin Purcell (Biomedical Engineering)

Microelectrode arrays implanted in the brain (neuroprostheses) have shown promise for treating intractable neurological diseases and injuries through stimulating or recording neuronal signals. For all of its successes, this method has problems such as signal degradation, which can severely reduce the effectiveness of the device over time. Contributing factors range from glial scarring to device failure. We are interested in whether or not alterations in firing patterns (plasticity) of neurons surrounding the device contribute to recording instability. An important metric for determining recording quality is the ability to extract single neuronal “spikes” or “units” from broadband recording data over time. To do this, spike-sorting algorithms have been developed to extract discrete units from unfiltered extracellular data. Here, we compare two approaches to spike sorting: an in-house MATLAB script and a commercially available Plexon Offline-Sorter, which differ in their methods of waveform identification. MATLAB sets a threshold floor of the signal to noise ratio for each channel, whereas Plexon uses a normal distribution of the raw waveforms with a defined standard-deviation floor. Preliminary data suggests Plexon extracts a greater number of units compared to MATLAB. Our ongoing work will continue to validate these methods using simulated data sets to identify the

"ground-truth" of the biological information reported. By establishing a reliable metric for evaluating signal quality, we can compare extracellular recordings with ion channel expression around a device to determine whether changes in plasticity contribute to recording instability over time.

INTERACTIVE SCIENTIFIC IMAGE ANNOTATION USING JUPYTER NOTEBOOKS
Nolan Feeny (University of Michigan)
Category & Time: Computer Science and Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 255
Mentor(s): Dirk Colbry (Computer Science & Engineering)

Jupyter is a communication platform that allows the integration of formated text, equations, multimedia and runable code into a single interactive document. Originally developed for use with the Python programming language, Jupyter is an ideal platform for communicating between research collaborators. Many of the major Python Libraries (ex: Matplotlib) can easily be utilized inside of a Jupyter Notebook. However, many other Python libraries still do not work well in Jupyter's Client/Server Environment (ex. QtPy). Because of this limitation, there are currently no Python libraries that allow users to easily select points or regions within an image or figure shown in a Jupyter Notebook and pass this information back into the Python program. With the integration of HTML, JavaScript, and Python, this project aims to develop an importable, easy-to-call library that lets programmers display an image or figure and have the users annotate the figure to provide feedback to the program. Such annotations include clicking on the image, and recording the location of the click by saving the X and Y coordinates as well as leaving a customizable point on the screen. This library would act similar to the ginput() function in MATLAB. Our group plans to share this library on GitHub to enable straightforward access to point-based image and figure annotation to programmers all over the world. Such a concept has benefits in diverse fields, including medical image analysis to environmental studies to business models.

TOWARDS A HAPTIC-AUDIO BASED MODELING ENVIRONMENT TO FACILITATE COLLABORATIVE MODELING WITH VISUALLY IMPAIRED PERSONS
Tia Fowlkes (Michigan State University)
Category & Time: Computer Science and Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 256
Mentor(s): Betty HC Cheng (Computer Science & Engineering)

Software modeling in the computer engineering industry is often represented by graphical diagrams, such as the Unified Modeling Language (UML). UML comprises several diagramming techniques for modeling information systems that generate structural and behavioral information, and is the de-facto industry standard. However, it can be challenging for a visually impaired person (VIP) to conceptualize the two dimensional UML graphical diagrams, thus making it challenging for them to collaborate with sighted developers. PRISCA is a software tool that was created to convert two dimensional diagrams created from an off-the-shelf UML editor into a format that can be printed on a 3D printer. A challenge with the 3D printouts is scalability and accessibility. Scalability is a challenge since the size of the graphical icons and the textual representation, captured in Braille limit the number of graphical elements that can be printed onto a 3D "sheet." Furthermore, the size of the Braille letters greatly limit the volume of text that can be "displayed" on a graphical element. As such, the objective of this research project is to develop software that will enable us to display the graphical models and the corresponding textual information on a tablet that provides haptic and audio feedback from the UML diagrams. By making use of the tablet interface, we intend to enable a VIP user to "pan" across larger models than what can be printed on a 3D printer. The haptic feedback will administer feedback regarding shapes, thus allow enabling the VIP user to determine spatial and hierarchical relationships between modeling elements. The audio feedback will describe design components of the diagrams based on the textual annotations. The user interface will allow sighted students and VIP to work collaboratively on modeling-based software projects.

EVOLUTIONARY COMPUTATION FOR ENERGY CONSERVATION WITHIN A DISTRIBUTED SYSTEM
Jose Hernandez (Michigan State University)
Category & Time: Computer Science and Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 257
Mentor(s): Charles Ofria (Computer Science & Engineering)

Distributed algorithms make use of multiple, independent agents to cooperatively solve a problem. Agents often lack global problem state information and must rely on local sensory information and communication in order to coordinate to solve a problem. Further, algorithms operating on real world systems of agents must often contend with limited energy and computational resources, making distributed algorithms challenging to design. Here, we use evolutionary computation to evolve distributed algorithms capable of solving a coordination and energy management problem.

DATA-DRIVEN SCORING FUNCTION DESIGN FOR DRUG DISCOVERY
James Lennon (Michigan State University)
Category & Time: Computer Science and Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 258
Mentor(s): Nihar Mahapatra (Electrical Engineering)

Protein-ligand binding affinity is the principal determinant of many vital processes, such as cellular signaling, gene regulation, metabolism, and immunity, that depend upon proteins binding to some substrate molecule. Consequently, it is extensively used in molecular docking for rational drug design, identifying the functions of proteins and their structures, studying cellular pathways, to name but a few. Due to prohibitive costs and delays associated with in-vitro screening of large libraries of organic molecules, pharmaceutical and biotechnology

companies rely on virtual screening using computational molecular docking to assay only the most putative active compounds. Typically, this involves docking tens of thousands to millions of ligand candidates into a target protein's binding site and using a suitable scoring function (SF) to evaluate the binding affinity of each molecule to identify the top candidates as well as their poses and bioactivities. In-silico screening has become attractive because of the ever-increasing number of available protein structures, bioassay data, and small organic molecules in publicly-accessible databases. This project will explore the design of next-generation scoring functions by coupling novel machine learning approaches with data-driven and multi-perspective modeling of protein-ligand interactions.

K-D TREE SEARCH ALGORITHMS FOR A NEAREST NEIGHBOR GAUSSIAN PROCESS MODEL
Alexander McKim (Clemson University)
Category & Time: Computer Science and Engineering, Section 2, 2:30 PM - 3:45 PM
Poster: 259
Mentor(s): Andrew Finley (Forestry)

Various statistical models for spatial data rely on some form of a nearest neighbor calculation among observed spatial locations. A brute force solution to a nearest neighbor calculation is easy to implement, but is computationally impractical for large data sets. Various data tree structures, e.g., k-d trees, have been proposed to improve the computational efficiency of nearest neighbor searches. Our focus is on efficient implementation of a statistical model called the Nearest Neighbor Gaussian Process (NNGP) that involves nearest neighbor searches for massive spatial data sets. We developed a specialized k-d tree structure and search algorithm designed to work with the NNGPs model assumptions. We compare the search time of our proposed k-d tree to that of a brute force nearest neighbor search under different parallel computing settings and data sizes.

CONTINUOUS LIDAR-CAMERA AUTOCALIBRATION USING OCCLUDING EDGE ALIGNMENT
Ryan Schiller (Michigan State University)
Category & Time: Computer Science and Engineering, Section 3, 2:30 PM - 3:45 PM
Poster: 264
Mentor(s): Daniel Morris (Electrical & Computer Engineering)

Many schemes for autonomous ground vehicles use a combination of cameras and LIDAR sensors to reconstruct their surroundings and navigate successfully. Calibration is necessary for the use of these sensors in this application but is often tedious as it entails placement of special calibration targets. We have developed a new method to continuously estimate calibration information for ground vehicles given LIDAR point clouds and camera images. Occluding edges in the LIDAR data are aligned with camera image edges in such a way as to reconstruct the extrinsic calibration parameters. Due to its reliance on scene edges, this method does not require the presence of calibration objects and instead calculates likely alignment by minimizing a cost function evaluated in terms of relative sensor alignment. We apply this method to one or many frames of combined LIDAR-camera information, and this continuous calibration allows the extrinsic parameters to grow in accuracy as more data points are integrated. Experiments using this method involve simulated tests using a standard data set and field tests using collected data serve to report the effectiveness of the algorithm's calibration capability.

A PERFORMANCE STUDY OF COMPUTATIONAL METHODS FOR RECOMBINATION BREAKPOINT DETECTION
Jack Smith (Michigan State University)
Category & Time: Computer Science and Engineering, Section 3, 2:30 PM - 3:45 PM
Poster: 265
Mentor(s): Kevin Liu (Computer Science & Engineering)

In the last decade, the cost of genetic sequencing has plummeted at an unprecedented and increasing rate. Due to this new availability, sequence data has become an increasingly indispensable tool for answering research questions in the life sciences. These growing datasets both challenge existing computational methods and provide opportunities for computation to provide new insights. One application which may benefit from new methods is the problem of recombination breakpoint detection. Genetic recombination is the process by which organisms inherit alleles not present in either parent through the mixing of parental genetic information. The particular locations within a sequence where recombination has occurred are called recombination breakpoints. Because recombination allows organisms to inherit new combinations of traits which would otherwise not be possible, locating these breakpoints is of great biological interest. We performed a simulation study with the goal of examining the performance of various current techniques which address the recombination breakpoint inference problem. In this study, we first used a model of inheritance with recombination to simulate the evolutionary history of a number of taxa and a site substitution model to evolve nucleotide sequences consistent with this history. This process allows us to have access to the true breakpoints in our test sequences, which is relatively rare with empirical data. Inference was then performed on the simulated sequences and the inferred breakpoints were compared to the known breakpoints to evaluate performance.

ANDROID MALWARE DETECTION
Seaver Thorn (East Carolina University), Harrison Mansour (University of Alabama - Birmingham)
Category & Time: Computer Science and Engineering, Section 3, 2:30 PM - 3:45 PM
Poster: 266
Mentor(s): Hani Alshahrani (Computer Science), Huirong Fu (Computer Science)

As Android holds a greater than 80% market share as of Q4 of 2016, it has become a prime target for cyber attacks in recent years. Although there are many ways for malware to enter your device, an increasingly popular method is through malicious applications. There are many malware detection and mitigation techniques implemented by antivirus applications on the Google Play Store, however their limited administrative capabilities under the Android OS leave them wanting for power. Our intent is to utilize hardware analysis to develop a more robust and comprehensive malware detection application than those that utilize static and/or dynamic techniques alone.

CONSTRUCTING VIRTUAL LABORATORY FOR RESEARCH AND EDUCATION
Nathan Torrez (Northern New Mexico College), Melissa Nichols (University of West Florida)
Category & Time: Computer Science and Engineering, Section 3, 2:30 PM - 3:45 PM
Poster: 267
Mentor(s): Anyi Liu (Computer Science & Engineering)

With the proliferation of the cloud computing paradigm, there is an increasing need to build sophisticated networks in a timely manner and adapt to dynamic business requirements. To meet these requirements, the artifacts in the network, such as the network topology, IP addresses, security policies, and routing rules, need to be scalable, elastic, and easy to be customized. In this project, we plan to use the software defined network (SDN) as the key technology to construct a virtual laboratory environment, which can handle the special requirements of a complex network. We will use CloudLab to setup different domains and build a scalable network. In addition, we will use the programming languages, such as Python, Java, C, and Bash, to implement the key functionalities of the system, such as setting up the security policies and changing the routing rules.

LABELING TOOL FOR TRAINING LEAF-DETECTION BY ROBOTIC PLATFORMS
Grace Yang (Michigan State University)
Category & Time: Computer Science and Engineering, Section 3, 2:30 PM - 3:45 PM
Poster: 268
Mentor(s): Daniel Morris (Electrical & Computer Engineering)

Rapid detection of diseases in field crops can enable crop growers prevent losses. In large fields, it may take days before the issue is addressed. If farmers use a drone to automatically detect diseased plants, finding and treating diseases would be faster. To create the machine, a manually programmed algorithm may not perform optimally. Instead, we will use machine learning. This requires labeled data and creating a labeled database is the goal of this project. We pay workers to label images for us through Amazon Mechanical Turk (AMT). Once workers submit their work, we can check and choose to accept or reject their work. Our task is to enable workers to outline leaves in an image. We will create a drawing tool that displays the image with HTML5 with zooming and drawing functions through JavaScript. The initial task lets the user click a point and drag the cursor to create a box, then adjust the border for optimal fit around the leaf. In the second task, the user will click points on the edge of the leaf to create a polygon shape around the leaf. Using the labels acquired through AMT, we will train a leaf-detection algorithm to identify leaves with minimal bends and blemishes at first; then, we will input more data until it can identify any type of leaf. In application, farmers will use the detection drone to identify diseased plants and their location.

REAL APPLICATION OF MULTI-ANGLE GAN FACE RECOGNITION BASED ON SDS-RCNN PEDESTRIAN DETECTION AND CNN FACE DETECTION
Ziyuan Zhang (Michigan State University)
Category & Time: Computer Science and Engineering, Section 3, 2:30 PM - 3:45 PM
Poster: 269
Mentor(s): Yousef Atoum (Electrical & Computer Engineering), Xiaoming Liu (Computer Science & Engineering)

Face recognition is a prevail topic in computer vision. However, it has to be based on quality of cropped faces by face detector. Two face matching applications will be discussed using multi-angle GAN based on neural network face recognition and CNN face detector within SDS-RCNN pedestrian detection. For those two applications, the final target is to find the people/person with inputting images of the person/people with high confidence.

ELECTRICAL AND COMPUTER ENGINEERING

DESIGN AND INTEGRATION OF RASPBERRY PI MODULE FOR GLIDING ROBOTIC FISH
Andres Aleman-Reyes (University of Puerto Rico Mayaguez Campus)
Category & Time: Electrical and Computer Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 273
Mentor(s): Osama Ennasr (Electrical & Computer Engineering), Xiaobo Tan (Electrical & Computer Engineering)

The development of new types of robotic fish, whereby maneuverability, computation, sensing and low-power consumption are simultaneously taken into consideration in the design evolvement, is an increasingly popular research topic. Gliding Robotic Fish (GRF) is a new kind of underwater robots that combine underwater glider and robotic fish properties and promise both low-power consumption and high maneuverability. Sensing and computation must co-evolve considering that these characteristics are intrinsic on GRF. Global warming, waste discharges in oceans, anthropogenic disasters and others have been affecting water resources and their environments, consequently sensing and computation of processes within such environments become more challenging daily. In this paper, a novel proposition to enhance computation system on GRF is developed. The computational paradigm of GRF is based on Raspberry Pi Zero W computation module, a device that has tremendous computation power for our application. Handling complex algorithms that incorporate adaptive sampling, prediction and autonomy will be achieved using this computer module. Also, feedback has been integrated into the design such as actuators controller and navigation system where complex decision-making algorithms are implemented. In this work, modularity is approached through the design of a PCB for the main system which includes Raspberry Pi, Real-Time Clock, Power Board, and main components where sensor modules can be attached easily. This scheme allows GRF to integrate any sensor according to the task its programmed to do. New GRF model “GRACE 3.0” will be tested to analyze the new computational power and compare it to that of the previous versions.

USING COMPUTER VISION TO TRACK OBJECTS BY A REMOTELY OPERATED UNDERWATER VEHICLE
Thamer Alsghan (Michigan State University)
Category & Time: Electrical and Computer Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 274
Mentor(s): Xiaobo Tan (Electrical & Computer Engineering)

In this project, computer vision is explored for enabling object tracking for a remotely operated underwater vehicle (ROV). OpenCV is a library tool that is being used for this purpose. The program will draw a rectangle around the objects and then take objects as inputs and then send data to the program to be analyzed and then tracked. The ROV will be tested under clean water, and issues such as murkiness will be handled in future work.

TAKING ROBOTIC FISH TO THE CLOUD
Edwin Avila Ortega (University of Puerto Rico Mayaguez Campus)
Category & Time: Electrical and Computer Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 275
Mentor(s): Osama Ennasr (Electrical & Computer Engineering), Xiaobo Tan (Electrical & Computer Engineering)

Robotic fish is an important invention due to its many applications such as underwater sensing. Our goal is to enable communication between a computer and a cellular module inside a robotic fish, through wireless communication, allowing researchers to control and acquire data from the robotic fish without requiring the researcher to be near the robot. Type of data that can be collected is application-dependent; for example, they can include temperature, harmful algae concentration, dissolved oxygen, among others. Current editions of gliding robotic fish rely on wireless communication using XBee, which can work up to 1 mile in an ideal environment. However, using a cellular module allows the robot to be controlled from virtually anywhere that has internet connectivity. In this research, an Electron, a cellular module that works in 2G and allows communication between the robotic fish and the user, is used. We test it by establishing communication, from different places, with the tower, and measuring the time that it takes to connect or reconnect after link disconnect. We develop a web page that has two objectives, establishing communication with the robotic fish from a platform that can be accessed from almost anywhere, and at the same time simplifying the interaction between the user and the fish. Initial development is focused on testing the communication system in the air, as it eliminates the difficulties commonly encountered in open water. We begin the experiments by analyzing how the weather affects the signal. The information obtained is analyzed by simulation or statistics.

MAPPING SMART INSTRUMENTS TO A PROVENANCE-AWARE AUTOMATED DATA ACQUISITION PLATFORM
Adam Gleichman (Michigan State University)
Category & Time: Electrical and Computer Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 276
Mentor(s): Andrew Mason (Electrical & Computer Engineering)

As science advances, testing in laboratory environments exhibits new challenges related to precision of measurements, efficiency of lab equipment usage, and organization and management of results datasets. Mapping smart laboratory instruments, capable of interfacing with a computer, to a streamlined experiment-management platform could allow personnel to remotely configure and perform tests with better precision and improved productivity. Moreover, linking valuable metadata defining experimental setup with recorded datasets, in a provenance-aware manner that enables tracing the history of instrument use and data access, could greatly improve repeatability of measurements and reproducibility of experiments in collaborating labs. Our lab is developing a user-friendly laboratory experiment platform that controls various lab instruments for automated data acquisition with improved measurement precision, allows users to create digital descriptions of experimental setups to reduce preparation time and eliminate gaps in time between tests to improve productivity, and manages results datasets in a provenance-aware manner. To aid in this goal, this summer project Created a mapping for microfluidic syringe pumps and air compressors that are demonstrated with a user controlled microfluidic graphical display by manipulating four different dyes in the microfluid channels.

CLASSIFICATION OF HUMANS AND VEHICLES USING MICRO-DOPPLER SIGNALS
Matthew Miller (Hampton University)
Category & Time: Electrical and Computer Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 278
Mentor(s): Jeffrey Nanzer (Electrical & Computer Engineering)

Our goal is to assist our autonomous car in avoiding impending dangers such as other cars and humans(kids/adults). We can do this by analyzing micro-doppler radar signals for machine learning processes. Machine learning is a term we use that coincides with a process of feeding clean filtered data to a system, programming and storing that data in constructed models, and then using those constructed models to predict future data in real time. A micro-doppler signature of a target is a time varying frequency modulation imparted on the radar echo signal by moving components. In other words, it's a signal that can display a frequency of all moving parts. For a human that would be the arm and leg swing relative to the steady moving torso/head, as for a car it would just be the moving body. By conducting controlled experiments and collecting data of multiple people and cars moving toward the radar we can analyze these signatures further. With this we can filter out the data signatures from various background noise, classify our controlled frequencies and construct models to begin the machine learning process. Currently, we are preprocessing data to filtering out our signals from background noise, but in the future, we'll soon find ourselves classifying the frequencies and training our models for real time use. With these sensor data analytics techniques, we can allow our autonomous vehicle to react in real time to oncoming frequencies.

MAGNETOELASTIC BASED SENSORS FOR REMOTE DETECTION AND SENSING
Solomon Remmo (Michigan State University)
Category & Time: Electrical and Computer Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 279
Mentor(s): Prem Chahal (Electrical & Computer Engineering)

The goal of the research is to create a handheld system for the detection of magnetoelastic sensors from a stand-off distance (~ 1m). Magnetoelastic materials can be adopted in the design of wireless sensor tags. This includes sensing of volatile molecules, humidity, temperatures and mechanical stress. The sensor is interrogated by wirelessly exciting the resonant frequency. The structure used here has a base resonant frequency of approximately 58 kHz. The reader circuit that is used to wirelessly interrogate the tag consists of either a separate transmitter and receiver, or a single coil transceiver with a switch. A function generator supplies an excitation pulse to the transmitter, which radiates to the location of the sensor. Using a sweeping frequency, the maximum frequency response of the sensor is recorded and compared to the base resonance. Comparing the frequencies allow the user to understand what physical conditions are affecting the tag. Interrogation range can be increased by increasing the coil diameter, improving signal-to-noise ratio, and by using higher power at the transmitter. The need for a hand-held system limits the size and power requirements. Thus, the best option is to enhance signal to noise ratio of the system. For the first application, the system will be demonstrated for use in tagging of underground pipes buried at a depth of 2 to 5 feet.

ENVIRONMENTAL SCIENCE & NATURAL RESOURCES

FORMULATING FORMALDEHYDE-FREE LIGNIN-BASED WOOD RESINS
Sasha Bell (Medgar Evers College)
Category & Time: Environmental Science and Natural Resources, Section 1, 2:30 PM - 3:45 PM
Poster: 280
Mentor(s): Mojgan Nejad (Forestry)

Formaldehyde (CH2O) are used in formulation of wood adhesives for many years. It is the most reactive, reasonably price which is produced in high quantity in the United States. Despite the high performance of formaldehyde-based resins, there are major concerns regarding chronic exposure to formaldehyde during the manufacturing process of the resin. Formaldehyde is a known carcinogen, toxic and volatile and the exposure to humans can cause adverse health effects. According to formaldehyde risk assessment study by EPA (1991), this is generally due to potential reactions of formaldehyde with proteins, which can cause skin irritation, and inflammation of eye membranes, nose and throat. In this research, our goal is to replace the formaldehyde portion of a lignin-based formaldehyde (LF) resin with glyoxal which is an environmentally friendly, non-toxic, non-volatile aldehyde. The aim of this project is to investigate formulation of 100% bio-based, formaldehyde free adhesive using glyoxal and lignin. Lignin is the second most abundant natural polymer made of up to 30% of plant. The lignin that will be used in this study is isolated as byproduct during ethanol production from corn stover. After confirming the feasibility of this approach, the next step would be to optimize the properties of the bio-based resin and the process parameters in order to obtain an adhesive with similar performance as of commercially formulated petroleum-based phenol formaldehyde adhesive.

EXTRACTION OF BACTERIA FROM UNTREATED WASTEWATER USING MAGNETIC NANOPARTICLES
Anjini Chandra (Michigan State University)
Category & Time: Environmental Science and Natural Resources, Section 1, 2:30 PM - 3:45 PM
Poster: 281
Mentor(s): Evangelyn Alocilja (Biosystems & Agricultural Engineering)

An economical method of removing bacteria from wastewater was developed and tested. Magnetic nanoparticles (MNP) were used to capture contaminant bacteria from samples of wastewater. The MNP were placed in samples of wastewater in a 1:10 ratio and left sitting for 5 minutes. The nanoparticles were then concentrated and removed with magnetic fields, and serial dilutions of the supernatant and MNP were plated on Tryptic Soy Agar (TSA) plates. After 24 hours, the count of bacteria on each plate was converted to colony forming units per mL (CFU/mL) and used to calculate the capture efficiency of the nanoparticles. The MNP captured bacteria in the wastewater after 5 minutes of exposure with an efficiency of at least 99.0 percent. After initial trials, MNP were rotated, placed in 100 mL of water, and used to clean the supernatant multiple times. The extraction of bacteria from untreated water with MNP is a simple and inexpensive process that can be carried out close to freshwater sources, thus making it a promising means of providing clean water to people in developing countries and low-resource settings.

PREDICTING MISSING VALUES IN BIODIVERSITY DATASETS USING PHYLOGENETICS AND SPATIAL MAPPING
Jay Jain (Louisiana State University - Shreveport)
Category & Time: Environmental Science and Natural Resources, Section 1, 2:30 PM - 3:45 PM
Poster: 282
Mentor(s): Quentin Read (Forestry), Phoebe Zarnetske (Forestry)

In recent years, the volume and availability of biodiversity data have grown greatly due to major digitization efforts and the emergence of citizen science. Despite the abundance of datasets available to ecologists, most biodiversity and species trait datasets have many missing values due to incomplete or inadequate sampling of organisms across species and spatial locations. Filling in missing data values is essential for ecologists to analyze biodiversity in the age of climate change, thus we propose a model that utilizes phylogenetic relatedness and spatial location to predict missing values in species trait datasets. Statistical methods have been developed to impute missing values using

phylogenetic relationships between species with unknown trait values and species where trait values are known. Additionally, methods use the spatial location of neighboring records to impute unknown values. However, no method to date combines both approaches to minimize uncertainty using (1) covariance with known trait values from the same species, (2) phylogenetically related species, and (3) relationships among traits of organisms that are close together in space. We developed a Bayesian method of imputation that incorporates phylogenetic and spatial sources of uncertainty. To assess the performance of our method, we used our imputation method to predict known data values using a dataset of functional traits of North American forest tree species, and we assessed the accuracy of the imputed values using confidence intervals. The method utilizing both genetic and spatial information is expected to perform better than when phylogenetic and spatial methods are implemented in isolation.

POLLEN ANALYSIS AND FORAGING BEHAVIORS OF MEGACHILE: THE LEAFCUTTER BEE
Michael Killewald (Michigan State University)
Category & Time: Environmental Science and Natural Resources, Section 1, 2:30 PM - 3:45 PM
Poster: 283
Mentor(s): Rufus Isaacs (Entomology)

To feed the ever-growing human population, farmers are expanding their agricultural production to meet nutritional demands. Although this provides a benefit to the human species, it decreases the amount of diverse floral habitats, and replaces them with monocrop fields. This is concerning because pollinators obtain most of their nutritional requirements such as pollen and nectar from floral resources located in natural habitats. Since many of these floral resources have been reduced in abundance and diversity, it has become increasingly necessary to identify which floral resources are most beneficial to pollinators. Because of their usefulness as managed pollinators of Alfalfa crop, bee species within the genus Megachile are one group of important crop pollinators. This project had three objectives: 1) to identify the primary pollen sources used by the nesting Megachile bee community, 2) to determine if the selection of pollen resources varied between female bees in the same landscape, and 3) to determine if the primary pollen source collected by a single female nesting Megachile bee changes through time. To answer these questions, four nesting boxes containing 250 stem nests of various sizes and materials were placed at the Michigan State University Clarksville Research Center in May 2016. From July-August, stems were monitored weekly, and completed stems were removed for processing. Pollen provisions were processed to examine defining characteristics of the pollen grains within and compared with a reference collection to determine pollen species. It was found that the pollen source of Megachile females remained consistent throughout the nesting season.

REMOVAL BACTERIA FROM RED CEDAR RIVER USING MULTIPLE MAGNETIC NANOPARTICLES EXTRACTIONS
Keila Rodriguez (University of Puerto Rico – Mayaguez)
Category & Time: Environmental Science and Natural Resources, Section 1, 2:30 PM - 3:45 PM
Poster: 284
Mentor(s): Evangelyn Alocilja (Biosystems & Agricultural Engineering)

According to the Word Health Organization (WHO), one of the most pressing concerns for our society is polluted water. Our planet is composed of 75% water, in which 97.5% is seawater and the other 2.5% is the amount of usable water available for population necessities. Under-developed communities around the world are the most affected with wastewater since they do not possess the resources to obtain drinkable water. Acknowledging the existence of this problem, we will work on finding a cost-effective alternative to purify water. The method that we will use in this research to purify water is Magnetics Nano-Particles (MNP). Currently, we use the MNP's to purify the local Red Cedar River water on the MSU Campus and we want to increase the efficiency using a multiple sets of MNP's at the same sample of river water. Previous experiments found that when the river water was purifying with twice MNP's set the efficiency will not increase. Through this research we want to explain why the multiples set of MNP's efficiency does not increase when used twice. Our research's hypothesis is that the distance between the bacteria and MNP affect the attachment process. After conducting the extraction process a few times, the distance between the bacteria and MNP is biggest, because the bacteria concentration was reduced. The data collected helps us to explain this behavior and design in the future a new procedure to achieve obtain a better quality of water and help disadvantaged communities.

MOLECULAR CHARACTERIZATION OF DIAPORTHE SPP. ON COLORADO BLUE SPRUCE (PIECEAE PUNGENS) IN MICHIGAN
Gabdiel E Yulfo-Soto (University of Puerto Rico – Mayagez)
Category & Time: Environmental Science and Natural Resources, Section 1, 2:30 PM - 3:45 PM
Poster: 285
Mentor(s): Monique L Sakalidis (Plant, Soil, & Microbial Sciences)

The Colorado Bruce Spruce (CBS; Piecea pungens) is the fourth most popular species of the Christmas tree production industry with an average of 23.70 acres/grower. Since 2006 there has been a decline in landscape CBS throughout the Lower Peninsula of Michigan. This decline corresponds to an initial loss of needles and eventual branch dieback from the lower portion of the tree gradually progressing upwards. A canker causing fungal pathogen from the genus Diaporthe has been consistently isolated from the phloem of symptomatic branches. Diaporthe spp. have a broad host and geographical range and are a threat to economically important crops throughout the world. Prior to the initial reports of declining landscape CBS, Diaporthe was only known as a nursery disease of CBS. It is important to investigate the epidemiology of disease in order to implement a sustainable management plan. This involves the morphological and molecular characterization of the species of Diaporthe implicated in the CBS decline. Diaporthe is a hyper-diverse species and typical sequencing genes like ITS has been shown to over-estimate the species. From a prior collection of Diaporthe isolates collected from nursery and landscape symptomatic CBS, we will sequence four gene regions (ITSrDNA, EF, Apn2 & His) and conduct a multi-gene phylogenetic analysis. We will also induce sporulation of the groups and describe morphological traits like spores and culture cultivation. By completing

the phylogenetic analysis and morphological description, we will describe the species and identify the species of Diaporthe infecting CBS from different locations and environments in Michigan.

EXPLORATION OF OPTIMUM PRE-COMMERCIAL THINNING TIME-FRAMES IN JACK PINE STANDS OF LOWER MICHIGAN WITH RESPECT TO KIRTLAND'S WARBLER NESTING HABITATS
Raven Mitchell (Northern Michigan University)
Category & Time: Environmental Science and Natural Resources, Section 1, 2:30 PM - 3:45 PM
Poster: 286
Mentor(s): David Rothstein (Forestry)

Jack pine (pinus banksiana) inhabits northeastern Lower Michigan in densely planted stands. In addition to being an economically important source of timber for pulpwood, these stands are the nesting site for the once endangered Kirtland's Warbler (KW). The Kirtland's Warbler nests are found exclusively in dense Jack pine (JP) stands 5-20 years old. To mitigate the Kirtland's Warbler's diminishing population, the Michigan Department of Natural Resources (MDNR) established dense Jack Pine plantations in the 1980's. These densely spaced tree stands lead to a commercially unproductive timber harvest during the trees' 50-year rotation. To ensure future KW population, JP stands must be harvested and for stands to be harvested, the stands must yield a profit. The focus of this research is to identify a time frame for pre-commercial thinning that will result in larger tree diameters and higher stand yields during a 50 year rotation of Jack Pine. Theoretically, this identified time frame will align with natural nesting preferences of the Kirtland's Warbler. To achieve this goal, nine tree stands, each containing six trees will be sampled. Basal disks from each tree will be analyzed utilizing dendrochronological methods. Finally, comparison with Kirtland's Warbler census data will aid in determining when to pre-commercially thin relative to the Kirtland's Warblers' behavior. The findings from this study will reveal quantifiable evidence that identifies an opportune time to thin Jack Pine stands.

INITIAL STAGES OF THE EAST AFRICAN RIFT – MAGMATISM IN THE OMO RIVER REGION
Rayn Phillips (Michigan State University)
Category & Time: Environmental Science and Natural Resources, Section 1, 2:30 PM - 3:45 PM
Poster: 287
Mentor(s): Tyrone Rooney (Earth and Environmental Sciences)

The East African rift system, which runs through the middle of southern Ethiopia, is one the most distinct, if not the most distinct example of rifting in the world. This rift system has been an area of active volcanism since the Eocene, therefore containing a magmatic record that provides insight into the rifts evolution. Thus, in efforts to understand the active processes in the area, multiple research projects have taken place. Two such projects proposed the idea of a two-plume model effecting the system, our research project will be able to support this hypothesis by asking the question "Is there a change in the composition of the magmatic source over time?". Our basalt samples were received from the Canadian Geological Survey, originally being collected by researchers during the Omo River Project. To investigate our question, we must analyze the geochemistry of these samples. However, this must be done in a way that will save as much of the sample as possible, these samples are very limited due to being the only living samples of these basalts from the Omo river area in East Africa. Thus, we are using inductively Coupled Plasma mass spectrometry (ICP-MS) to analyze samples, this method can provide the geochemistry of a sample, using a minute amount . ICP-MS Ionizes the atoms in an element, which are then separated and weighed by the mass spectrometer for further identification. From these results, we can decipher the composition of our samples, while preserving as much of them as possible.

EPIDEMIOLOGY AND PUBLIC HEALTH

MEDICAID EXPANSION STATES VS NON-EXPANSION STATES
Dukernse Augustin (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 1, 1:00 PM - 2:15 PM
Poster: 444
Mentor(s): Claire Margerison-Zilko (Epidemiology)

In 2014 the Affordable Care Act was enacted to expand Medicaid eligibility for adults earning within 138% of the federal poverty level. Although this policy was intended to be implemented in all states, the authority to provide Medicaid is held at the state level. Thus, the U.S Supreme Court gave states an option to adopt the expansions or not. Only 24 states adopted the policy which affected 6.7 million low-income adults that were not previously eligible. My study specifically looks at women within the states that expanded their Medicaid program and deciphers whether they were more likely to have access to care, be in better health and/or try to stop smoking compared to women living in states that did not expand Medicaid. Did the Medicaid expansion affect access to health care, general health, and/ or smoking behavior among women ages 15-44 in the US? The Medicaid Expansion positively affected access to health care, general health and decreased smoking behaviors in women ages 15-44 in US. Estimates are from the US Behavioral Risk Factor Surveillance System (BRFSS) (N=10,000), an annual, cross sectional, nationally representative survey of US adults. The analytic sample (subset of whole data that I will use for analysis) will be non-pregnant women ages 18-44.

EARLY LIFE UNDERNUTRITION INFLUENCING LEFT VENTRICULAR HYPERTROPHY
Brandon Brown-Ruffin (Virginia Union University)
Category & Time: Epidemiology and Public Health, Section 1, 1:00 PM - 2:15 PM
Poster: 445
Mentor(s): David Ferguson (Kinesiology)

Undernutrition during neonatal life has been shown to increase the risk of cardiovascular disease (CVD) in adulthood. It is hypothesized that early life undernutrition will decrease heart size yet over time the myocardium will increase mass to overcome afterload, which will lead to CVD. The purpose of this study was to determine if early life undernutrition altered left ventricle mass and if physical activity engagement can serve as a therapeutic countermeasure. Mouse dams were fed a control diet (CON: 20% protein), or a low-protein diet (LP: 8% protein) beginning one week before mating. At birth, mouse litters were standardized to weight and sex resulting in a gestational undernutrition (GUN; EB1-18), postnatal undernutrition (PUN, days 1-21 of life) and a control group (CON). At PN21 all pups were weaned from the dam and fed the control diet. At PN45 mice were individually housed with running wheels where a daily distance ran was measured. At PN70 Echocardiograms were performed on mice that had access to the wheel as well as sedentary mice. Left ventricular mass (LVM), the left ventricular chamber volume, and the stroke volume (SV) were measured. Mice who were physically active had a larger LVM, regardless of diet. Although, the PUN and GUN groups did have a significantly lower SV than the CON, whether the mouse had any physical activity or not. Thus, a brief episode of undernutrition in early postnatal life impaired functional capacity and thereby increased the risk for the development of cardiovascular diseases.

A CASE SERIES OF CARFENTANIL-INDUCED DEATHS
Nick Corsi (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 1, 1:00 PM - 2:15 PM
Poster: 446
Mentor(s): James C Anthony (Epidemiology and Biostatistics), Ljubisa Dragovic (Chief Forensic Pathologist/Medical Examiner)

With a lethal dosage estimated at 20 one-millionths of a gram, a classified schedule II drug has concealed itself within the U.S. illegal drug trade. As the fatalities of this synthetic drug known as Carfentanil continue to climb, little has been discovered about its biological effects. Driven by the market, dealers have been found to secretly mix their heroin supply with Carfentanil to increase profits at the cost of human life. The purpose of this study is to highlight the risks of exposure to law enforcement and emergency medicine providers and increase awareness of the opioid epidemic. This case series is the first to explore fatalities with quantified Carfentanil toxicity. All public deaths in the Oakland County Medical Examiner's office database, ranging back to November of 2016, were reviewed for positive Carfentanil screening. Carfentanil as detected through gas chromatography-mass spectrometry at NMS laboratories. Eighteen cases of fatal intoxications were identified and retrospectively evaluated. Each decedent's social/medical history, postmortem findings at scene, autopsy results, and toxicological screenings were collected to characterize the death. Each case tested positive for polymedication abuse, and six cases underwent Naloxone intervention with an unsuccessful outcome. The mean lung weight at autopsy was found to be 1,535.91 g and 61% of the deaths were under the age of 35. Ultimately, the cases reported hopefully provides foundation for further, developed studies investigating Carfentanil and life supportive measures for healthcare providers.

DIFFERENCES IN STAFF VIEWS OF BARRIERS, FACILITATORS, AND TRAINING NEEDS TO IMPACT CHILDREN'S HEALTH AT MICHIGAN MIGRANT AND SEASONAL HEAD START CENTERS
Oluwatobi Dauda (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 1, 1:00 PM - 2:15 PM
Poster: 447
Mentor(s): Elahé Crockett (Medicine), Amanda Knox (Food Science & Human Nutrition), Won O Song (Food Science & Human Nutrition)

Introduction: Migrant and Seasonal Farmworkers (MSFW) are a marginalized and understudied population. MSFW children experience significant health disparities. Staff in Michigan Migrant Head Start (MMHS) centers can influence the health behaviors of the children. MMHS centers offer education and childcare services to young MSFW children. Staff in the centers may have an impact on the children's nutritional behavior and physical activities. There is currently no research on views of staff on nutrition and physical activity practices in the centers.AIM: Aim: The purpose of this research was to compare the perspectives of staff working directly with children and center directors regarding nutritional and physical activity concerns. Methods: Focus groups were administered to MMHS center directors (n=2) and staff working with children (n=5) from July to September 2016. Two trained researchers asked participants about staff training needs as well as nutrition and physical activity concerns with caregivers (staff and parents) and children of MMHS. Focus group data were transcribed verbatim and analyzed using NVivo 11 Starter for Windows. Results: Preliminary findings reveal conflicting views on nutrition and physical activity of MMHS directors and staff, and reveal areas of improvement for staff training. Conclusion: Conflicting opinions on health and training needs could hinder positive nutrition and physical activity practices among MMHS caregivers and children. Findings from this research can support policy changes and system-wide improvements to health and nutrition services in the MMHS centers. Support: O.D. is a REPID scholar, supported by NIH-5—R25-HL108864 award to E.C

IDENTIFYING AND UNDERSTANDING COMMUNITIES WHERE DEPRESSED PEOPLE TURN TO TWITTER AT HIGH RATES

Amber DeJohn (Michigan State University), Emily Schulz (Michigan State University)

Category & Time: Epidemiology and Public Health, Section 1, 1:00 PM - 2:15 PM
Poster: 448
Mentor(s): Amber Pearson (Geography, Environment, and Spatial Sciences), Andrea Wittenborn (Human Development & Family Studies)

About 7% of U.S. adults suffer from depression each year, but only half seek professional help. Increasingly, depressed individuals turn to virtual communities for support. Research indicates that depressed internet users engage in online communities to retrieve information and social support with minimal risk of experiencing social stigma. This study sought to understand which type of communities have higher than expected rates of members with depression reaching out to the online community. Using a subset of tweets identified by the hashtag #mydepressionlookslike, this study explored which county-level characteristics exhibit a significant effect on the number of online depression support-seekers. Tweets were collected using NCapture, an addition of the qualitative analysis NVivo software. Next, spatial data was compiled on community characteristics for all counties in the study region, which includes New England and Mid-Atlantic states. Spatial community characteristics of interest include those previously established in the literature that may contribute to depression, including rates of violent crime, access to mental health care providers, and community composition, i.e. race, income, gender, etc. A regression model was used to predict the number of online depression support-seekers, whereby the online community was a proxy for actual depression prevalence, and community characteristics served as the predictors. Then, regression residuals were examined, and counties received a rank from higher than expected to lower than expected online support seekers. Finally, the study evaluated a suite of community conditions. Hopefully, the results will start a conversation about how American communities can combat mental illnesses like depression.

ARE LEVELS OF PERCEIVED STRESS LOWER IN AFRICAN-AMERICAN PREGNANT WOMEN WHO HAVE A CLOSE RELATIONSHIP WITH THE FATHER OF THEIR BABY?

Relicious Eboh (University of Detroit Mercy)

Category & Time: Epidemiology and Public Health, Section 1, 1:00 PM - 2:15 PM
Poster: 449
Mentor(s): Dawn Misra (Family Medicine and Public Health Sciences)

African-American women experience a disproportionately high rate of stress-related health problems, including adverse birth outcomes. A few studies have shown that paternal support could moderate or alleviate the stress on pregnant woman, in which in turn may decrease a woman's chance of having a poor birth outcome. We examined the levels of perceived stress in African-American pregnant woman in relation to their relationship to the father of the baby in a cohort study of preterm birth in Black women in Southfield, Michigan (N=1411; 71% response rate). Data were obtained from maternal interviews during the postpartum hospitalization and medical record abstraction. Levels of perceived stress was measured by Cohen's Perceived Stress Scale for the pregnancy period. The instrument contains 14 items on a 5-point scale (1=never to 5=very often) that ask about feelings and thoughts during the prior month (e.g. "felt upset," "stressed out"). The status of the mother's relationship with the father of the baby (FOB) before and during the pregnancy was measured using a 5-point Likert Scale (1= very close to 5=very cold). Women who reported to have a close relationship with the father of the baby during pregnancy experienced less stress than women with a cold relationship. The relationship with FOB before pregnancy seemed to have less effect. Our results suggest that paternal involvement from the father of the baby before and during pregnancy could minimize a women's stress levels to ensure a healthy, full-term birth.

POSITIVE AND NEGATIVE HEALTH IMPACTS OF WATER PRIVATIZATION

Benjamin Dougherty (Michigan State University)

Category & Time: Epidemiology and Public Health, Section 2, 2:30 PM - 3:45 PM
Poster: 452
Mentor(s): Amber Pearson (Geography, Environment, and Spatial Sciences)

There has been a global push to privatize various aspects of water provision, from the pipes themselves to household water utility providers. A few countries have become global examples of water privatization through high profile media coverage or large unexpected consequences. The health consequences of water privatization have not yet been examined on a larger scale or comprehensively. The purpose of the proposed research is to examine the health consequences of water privatization in countries across the globe, which will leverage prior work by the research team in assembling a global dataset of water privatization activity from the 1980s to 2016. This project aims to assemble a database of health outcomes (positive and negative) associated with water privatization on a country by country basis, and explore trends in health consequences of privatization by country, region, and globally. Descriptive analyses will include maps (by decade) of: the countries with private water provision or infrastructure, the countries where the private companies are headquartered, and the countries reporting positive versus negative health consequences. Next, we will generate descriptive statistics for the private water corporations including the number of countries where they operate, the decade in which they implemented the most schemes, the count of schemes which were the result of debt to international agencies and the number of positive or negative reported health events. The results of this analysis may help direct future research in health events related to water privatization.

EVALUATING QUANTITY AND QUALITY OF URBAN GREEN SPACE USING GOOGLE STREET VIEW
Benjamin Dougherty (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 2, 2:30 PM - 3:45 PM
Poster: 453
Mentor(s): Amanda Rzotkiewicz (Geography, Environment, and Spatial Sciences)

Urban green spaces have been associated with a variety of positive health outcomes, including increased physical activity and promotion of positive mental health. In shrinking cities, where social cohesion is low and prevalence of anxiety and depression is high, exposure to urban green spaces may be particularly beneficial. Google Street View (GSV) has been used as an effective, accessible tool for the evaluation of the built environment. Currently, evaluation of green space using GSV is limited to an automated method developed by the MIT Senseable City Lab, which delineates green space from panoramic views obtained through the Google Maps API and determines a score based on proportion of green pixels. Specifically, this study aims to: 1) develop transparent criteria for comprehensively assessing parcel- and neighborhood-level green space, including quantity and quality; 2) perform the newly developed methodology on a sample of address locations/parcels in Ingham County, MI and validate the criteria via ground-truthing; and 3) compare the results of the new methodology, the automated measure of GSV visual greenery developed by the MIT Senseable City Lab, and the ground-truth measure (as gold standard). Developing a methodology that addresses these limitations would improve the comprehensive and fine scale measurement of neighborhood green space, with implications for health research.

BLOOD PRESSURE MONITORING DURING NEURO-INTERVENTIONAL PROCEDURES FOR ACUTE ISCHEMIC STROKE
Karam Gagi (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 2, 2:30 PM - 3:45 PM
Poster: 454
Mentor(s): Elahé Crockett (Medicine), Mohammad Farooq (Hauenstein Neuroscience Center), Philip Gorelick (Hauenstein Neuroscience Center)

Introduction: The brain maintains a relatively constant cerebral blood flow between perfusion pressures of 50 and 150 mm Hg by pressure-dependent activation of the smooth muscle in the precapillary arterioles by cerebral autoregulation. Cerebral autoregulation is affected during cerebral ischemia. Hypothesis: If there is significant blood pressure drop during a neuro-interventional procedure, it can lead to worsening of cerebral ischemia and extension of ischemic stroke. This is of more concern if the patient is undergoing neuro-interventional procedure under anesthesia. Methods: This is a retrospective review of medical records of the stroke patients who have undergone a neuro-intervention during the time period of January 2012 to April 2017. Results: Evaluation will use pre- and post- neuro-intervention procedure outcomes such as the NIHSS (National Institute of Health Scale Stroke) and the mRS (Modified Rankin Scale) to compare the effect of the neuro-intervention on the patient health in relation to changes in the blood pressure during the procedure. Conclusion: The data may improve stroke management procedures throughout the Trinity Health Network nationwide. Support: K.G. is a REPID scholar, supported by NIH-5-HL108864 award to Elahé Crockett, REPID-Program Director.

IDENTIFYING THE EFFECT OF IMPROVING DIABETES KNOWLEDGE AND SHARED DECISION MAKING EDUCATION ON PATIENT'S EXPERIENCE WITH TECHNOLOGY IN FEDERALLY QUALIFIED HEALTH CENTERS
Aja Green-Walker (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 2, 2:30 PM - 3:45 PM
Poster: 455
Mentor(s): Elahé Crockett (Medicine), Adesuwa Olomu (Medicine)

Introduction: Health Information Technology (HIT) was developed as an innovative way to improve patient's access to health care, however there may be a difference in patient's experience using technology. Objectives were 1) To assess patient interest and experience using text messages to communicate with health care providers and 2) To determine if there are differences in the usage of technology between the Intervention (Green) and Control (White) clinics. Hypothesis: There is a difference in CareSmarts usability between the Intervention and Control clinics which leads to patient's experience using technology and their health care plan. Method: The Office-GAP Program is a quasi-experimental, two clinic study designed to improve collaboration between patients and providers and to improve cardiovascular outcomes for low income populations with diabetes and cardiovascular disease. The study consists of an Intervention group that received Shared Decision Making Education (SDM) and Decision Aids (DA) and a Control group that did not. CareSmarts is a mHealth diabetes program that provides self-management support and team-based care management for people with diabetes through automated text messages. A GEE model was used to analyze CareSmarts usability scores. Conclusion: The Intervention team had a significantly higher score compared to the Control team for ease of use of CareSmarts and finding the content of CareSmarts messages to be well integrated with their care plan. Support: Aja is a REPID scholar supported by NIH-5-R25-HL108864-award to Elahé Crockett, REPID Program Director.

EARLY LIFE UNDERNUTRITION INFLUENCES ON VOLUNTARY PHYSICAL ACTIVITY ENGAGMENT
Jasmine Hunter (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 2, 2:30 PM - 3:45 PM
Poster: 456
Mentor(s): David Ferguson (Kinesiology), Eric Lesczcynski (Kinesiology), Ashley Triplett (Kinesiology)

The Developmental Origins of Health and Disease Hypothesis states that a period of undernutrition in early life will increase the risk of chronic disease in adulthood. It is hypothesized that early life nutrition could influence physical activity engagement as well. Thus, the purpose of this study was to quantify physical activity engagement as measured by mouse wheel running in mice that experienced a brief period of under nutrition. Using a cross fostering model, dams were fed either a control diet (20% protein) or an isocaloric low protein diet (8% protein) to induce early life undernutrition resulting in a control (CON), postnatal undernutrition (PUN), and gestational undernutrition

(GUN) group. The pups were kept with their mother until 21 days after birth (PN21) when they were weaned and placed on CON diet until PN45 when each mouse was individually housed and given access to a free-running wheel. Spins of the wheel per day were calculated to track voluntary physical activity. A one way ANOVA was used to compare daily physical activity between the three nutritive groups. Results indicated the CON (21,096±8,914 spins/day) and GUN (22,188.6±6804 spins/day) groups ran more than PUN group by (17,036.6 ±8,718 spins/day). PUN spins/day for male mice was significantly different (P<.05) than the other groups. Thus, it appears that postnatal undernutrition impairs physical activity engagement.

COMPARING NEUROPSYCHIATRIC SYMPTOMS (NPSS) IN MIDDLE-AGED AND SENIOR INDIVIDUALS WITH MILD COGNITIVE IMPAIRMENT (MCI)
Caroline Lopez-Martinez (Northeastern Illinois University)
Category & Time: Epidemiology and Public Health, Section 2, 2:30 PM - 3:45 PM
Poster: 457
Mentor(s): Ashley Hannah Sanderlin (Neuroscience)

Alzheimer's disease (AD) is the sixth-leading cause of death in the United States, with a higher prevalence of neuropsychiatric symptoms (NPSs), such as depression and motor disturbance. Mild cognitive impairment (MCI) is an intermediate level of small, cognitive decline that does not affect daily life. In MCI individuals, the risk for developing AD substantially increases. The presence of NPSs in people with MCI additionally rises the risk of AD development. It is not known whether age affects the manifestation of NPS in MCI. This study will investigate how the frequencies of NPSs differ amongst MCI individuals who are middle-aged and those who are seniors. To assess NPSs in an MCI sample, the Alzheimer's Disease Neuroimaging Initiative (ADNI 2) database will be utilized. The Neuropsychiatric Inventory Questionnaire (NPI-Q) examines twelve different NPS domains. These domains include the following: delusions, hallucinations, agitation/aggression, depression/dysphoria, anxiety, elation/euphoria, apathy/indifference, disinhibition, irritability/lability, motor disturbance, nighttime behaviors and appetite/eating. The Geriatric Depression Scale (GDS) measures depression and possible underlying cause on a fifteen-question scale. To statistically analyze this data, two forms of analysis will be employed. The Chi-square will determine the frequency of NPIQ's twelve NPSs across two age groups: middle-aged (50-65 years) and seniors (over 65 years). An ANOVA will compare the total scores of both the NPIQ and GDS across the age groups. In this study, we hypothesize that middle-aged MCI subjects will have a higher frequency of behavioral NPSs (e.g. depression/dysphoria), while senior MCI subjects will have a higher frequency of cognitive NPSs symptoms (e.g. irritability/lability).

INTESTINAL RESPONSES TO ANTIBIOTICS IN MALE AND FEMALE RAG-KNOCKOUT MICE
Tyshana Johnson (University of Central Florida)
Category & Time: Epidemiology and Public Health, Section 3, 2:30 PM - 3:45 PM
Poster: 459
Mentor(s): Laura McCabe (Physiology), Narayanan Parameswaran (Physiology), Naiomy Rios-Arce (Physiology)

Antibiotics are widely used for the prevention and treatment of various bacterial infections. They also have been shown to have adverse side effects, such as disruption of the intestinal immune system. Previous experiments from the lab have shown that males and females respond differently to the antibiotics treatment. The purpose of this experiment is to determine how oral antibiotics affect inflammatory gene expression in the large and small intestine in the absence of an adaptive immune system. We hypothesize that the inflammatory markers will increase in response to the antibiotic treatment and this would be diminished in the RAG knockout mice. RAG-1 knockout (lack mature T and B lymphocytes) male and female mice and their corresponding wild-type controls received antibiotic treatments for two weeks (ampicillin and neomycin) in the drinking water. After treatment, the intestinal segments were harvested and RNA extraction performed with Trizol. The cDNA underwent a polymerase chain reaction to determine the differences in the inflammatory and anti-inflammatory genes: tumor necrosis factor alpha, interleukin-6, and interleukin-10. Males and females responded differently to the antibiotics especially in the absence of an adaptive immune system. Understanding the relationship between the response to antibiotics in the gut of male and female mice will lead to effective methods to specifically prevent unwanted side effects.

DO THE FOODS AND BEVERAGES SERVED BY IN-HOME CHILD CARE PROVIDERS MATCH THE MENU?
Anna Jursinic (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 3, 2:30 PM - 3:45 PM
Poster: 460
Mentor(s): Dawn Earnesty (Food Science & Human Nutrition), Lorraine Weatherspoon (Food Science & Human Nutrition)

To what extent do the foods and beverages written on the childcare provider menu, match the actual foods and beverages served by in-home child care providers to children 2-5 years of age. A cross-sectional design was used. A weekly menu was provided that reported the types and amounts of foods and beverages served and compared with direct diet observation. Low-income eligible family and group child care provider homes in 14 counties in Michigan. 36 childcare providers were included. Percentage of child care providers where the menu matched the observed data for snack, lunch and the food groups in lunch. Child care providers were assigned a 1 or 0 based on if the menu items matched. A score of 0 was assigned when what was served does not match what is written, and a score of 1 if the menu matched. 44% of the childcare provider menus matched for lunch. For the lunch food groups 86% matched for dairy, 69% for protein, 69% for vegetable, 75% for fruit and 86% for grains. Of the 36 providers, 47% of the menus matched for snack. This information can help show the benefits of participation in the Child and Adult Care Food Program and how monitoring visits are beneficial to check compliance. Additional education may be needed on CACFP nutrition standards and compliance. Overall this study can help provide education for professionals and providers so they can provide higher quality food and beverages.

USING FACEBOOK IN A HEALTHY LIFESTYLE INTERVENTION: FEASIBILITY AND ACCEPTABILITY
Haley Ade Lyons (Michigan State University), Yan Shi (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 3, 2:30 PM - 3:45 PM
Poster: 461
Mentor(s): Jiying Ling (Nursing), Lorraine Robbins (Nursing)

Facebook is becoming a promising strategy to deliver research interventions but no study identified used Facebook to target Head Start families. The study aimed to evaluate the feasibility and acceptability of using Facebook to deliver a healthy lifestyle intervention to Head Start parents. A 10-week program was implemented via a private interactive Facebook group and app to promote healthy eating and physical activity among parents. Parents were asked to complete two challenges and one quiz per week. Thirty-four Head Start parents participated in the program. On average, parents logged in the study app 29 times during the program (min-max: 1-129). The peak log-ins occurred on Friday (n=147), Thursday (n=153), and Saturday (n=180). Twenty-six (76.5%) parents competed all challenges with weekly completion rate ranging from 79.4% to 85.3%; and 28 (82.4%) completed all quizzes with weekly completion rate from 82.4% to 94.1%. Parental acceptability of the program was assessed through individual interviews with 15 randomly selected parents. All 15 parents were satisfied with the weekly challenge and quiz content and frequency, but two parents suggested more challenges and quiz questions. The leading reported barriers to completing changes and quizzes were lack of time, technology difficulties, and split families. The study concluded that using Facebook to deliver a healthy lifestyle intervention among Head Start parents was feasible and acceptable. From this presentation, the audience will learn how to evaluate intervention feasibility and acceptability, and how to use Facebook to deliver a healthy lifestyle intervention among low-income families.

INFLUENCE OF OFFICE-GAP AND CARESMARTS ON MEDICATION ADHERENCE AND OVERALL HEALTH OF DIABETICS
Batoul Sadek (Michigan State University)
Category & Time: Epidemiology and Public Health, Section 3, 2:30 PM - 3:45 PM
Poster: 462
Mentor(s): Elahé Crockett (Medicine), Adesuwa Olomu (Medicine), Maliha Taufiq (Medicine)

Introduction: Office-Guidelines Applied to Practice (Office-gap) is a more individualized approach to patient- physician interaction, which is designed to improve secondary prevention of heart disease for patients with diabetes and heart disease. Caresmarts CareSmarts is a Health diabetes program that provides self-management support and team-based care management for people with diabetes through automated text messages. Objective: To determine the effect the Office-GAP program and Caresmarts application have on overall health and medication adherence in minority and low-income populations that face health disparities related to cardiovascular health. Method: Caresmarts is a texting application that sends daily reminders to patients to uphold their daily health. The study had two groups- a control group and an intervention group. Each group had to attend a group visit and two follow up visits. The control group is white while the intervention group is green. For the intervention group, the group visit included a one on one discussion of diabetes and how to manage it better. During each visit the patients filled out the Summary of Diabetes Self-Care Activities Assessment (SCDSA) and the Morisky Medical Adherence Survey. Conclusion: These surveys will provide us insight on how patients uphold different components of their daily health. The data is still being collected and under analysis for this study. Support: Batoul Sadek is a REPID scholar supported by NIH-5-R25-HL108864-award to Elahé Crockett, REPID Program Director.

THE EFFECT OF CHRONIC CADMIUM EXPOSURE ON IMMUNE PARAMETERS OF RAT SPLENOCYTES
Marissa Salazar (Michigan Sate University)
Category & Time: Epidemiology and Public Health, Section 3, 2:30 PM - 3:45 PM
Poster: 463
Mentor(s): Rebekah Kennedy (Pharmacology & Toxicology)

Cadmium (Cd) is a non-essential and toxic metal released into the environment naturally or through anthropogenic sources. The main route of human exposure occurs through the diet, while cigarette smoke constitutes an additional exposure source. The primary targets of Cd toxicity are the kidney and bone, and Cd is also a known immunotoxicant. Cd induces splenomegaly and immunomodulatory effects on adaptive immune responses have been shown, but there is great variability in the specific effects seen with Cd, and cell-type specific effects remain poorly characterized. To address this gap, the effect of Cd exposure on T-cell responses was investigated in rat splenocytes. Sprague Dawley rats were provided 50 ppm Cd daily through the water for 10 weeks, after which splenocytes were isolated and immunophenotyped. Remaining splenocytes were treated with anti-CD3/anti-CD28 to activate T-cells, cultured, and mRNA was isolated. mRNA will be converted to cDNA and relative gene expression of cytokines produced in response to immunogenic stimuli by various T-cell subsets will be quantified with RT-qPCR. This project will provide insight into the immunomodulatory potential of Cd exposure on T-cell function.

INTEGRATIVE BIOLOGY

CARDIOVASCULAR SYSTEM AND ATHEROSCLEROSIS
Camery Abram (Michigan State University)
Category & Time: Integrative Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 297
Mentor(s): Chunqi Qian (Radiology)

This project focuses on the cardiovascular system and plaque accumulation within the arteries, known as Atherosclerosis. Conducting research in this area will make space for medical innovations and more specifically, detection of plaque accumulation in small spaces such as the aortic arch and carotid bifurcation. After analyzing the regions of Atherosclerosis within the images of mice, amount of plaque build up, and its interaction with blood flow, we will be able to make interpretations and draw conclusions regarding the characteristics of the condition. Using the newly developed imaging technology by Dr. Qian and his colleagues, we are able to accurately assess the affected legions within the mice. Using MATLAB software we will be able to take the images and interpret them by viewing the images in different hues. These images will highlight different areas of the Atherosclerosis, thus allowing us to examine the images at different angles and also expand the images to see the amount of plaque accumulation. Given these techniques, we could potentially focus on a few areas of interest which include the mice's diet in relation to Atherosclerosis, the mice's amount of physical activity, and the effect of nicotine exposure.

EXPRESSION OF HYPOTHALAMIC SEROTONIN 1A, 2A, AND 2C RECEPTORS ACROSS REPRODUCTIVE STATES IN FEMALE RATS AND THEIR POTENTIAL ROLE IN MATERNAL AGGRESSION
Shantee N Ayala-Rosario (Inter American University of Puerto Rico Bayamon Campus)
Category & Time: Integrative Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 298
Mentor(s): Joseph Lonstein (Psychology), Erika Vitale (Psychology)

Serotonin (5-hydroxytryptamine) is a neurotransmitter that regulates multiple aspects of maternal behavior in mammals. Maternal aggression toward threats can be observed during the postpartum period in many species, and such behavior is fundamental for the well-being and survival of the offspring. This behavior may be partly regulated by the serotonergic system (5-HT) originating from cell bodies in the midbrain dorsal raphe (DR), which provides most serotonin projections to the forebrain. A previous study from our lab showed that when the serotonergic neurons of the DR are lesioned during pregnancy or after parturition, postpartum female rats show reduced maternal aggression. Furthermore, in the lesioned subjects, serotonin fibers were lower in total length in the anterior hypothalamus (AH), and others have also implicated serotonin in the AH to aggression in male and female hamsters. The aim of the current study is to determine whether the expression pattern of serotonin receptors in the AH fluctuate across reproductive states and contribute to the display of maternal aggression. Three receptor subtypes were chosen for qPCR analysis based on previous literature linking them to maternal aggression: 1A, 2A, and 2C. AH samples were collected from diestrus virgins (DV), 10-day pregnant (P10), recently parturient, postpartum day 7 (PP7), and postpartum day 19 (PP19) rat brains. These time points were chosen for the diverse magnitudes of aggression expressed across these periods. The desire is to better understand the neurobiological processes that underlie maternal aggression and other postpartum behaviors.

EFFECT OF ANTIBIOTIC MANIPULATION ON IGF-1 LEVELS IN THE LIVER.
Nicholas Chargo (Michigan State University)
Category & Time: Integrative Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 299
Mentor(s): Laura McCabe (Physiology), Jonathan Schepper (Physiology)

Antibiotics are commonly used clinically due to their anti-bacterial effects. Although effective at treating bacterial infections, antibiotics also deplete the intestinal microbiota. Recent research indicates that the composition of the microbiome can impact bone health. The mechanisms accounting for beneficial gut-bone signaling are not known. However, the portal vein moves blood and bacteria from the gut to the liver and we hypothesized that the liver could play a potential role in microbiome signaling to bone. This is supported by the microbiota composition regulating liver expression and secretion of insulin–like growth factor 1 (IGF-1), a key bone anabolic factor. Therefore, in the present study, we examined changes to liver and serum IGF-1 levels following gut microbiome manipulation (depletion and repopulation) with antibiotic treatment. We also tested the effect of probiotic Lactobacillus reuteri treatment on IGF-1 expression following antibiotic treatment. Antibiotics (ampicillin (1g/L) and neomycin (0.5g/L)) were given to 12-week-old BALB/c mice for two weeks and then the microbiota was allowed to repopulate over the next 4 weeks with or without L.reuteri treatment. RNA was extracted from the liver, reverse transcribed, and real time PCR was used to analyze gene expression of IGF-1. Serum and RNA levels of IGF-1 will be compared between conditions by ANOVA. Our goal is to determine if there is a link between IGF-1 and bone health: with low IGF-1 associating with bone loss while high IGF-1 levels associating with bone health. This would support future mechanistic studies testing the links between gut-liver-bone signaling.

CHANGES IN THE MIDBRAIN OXYTOCIN SYSTEM ACROSS FEMALE REPRODUCTIVE STATE
Monica Davis (Michigan State University)
Category & Time: Integrative Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 300
Mentor(s): Zachary Grieb (Neuroscience), Joseph Lonstein (Psychology)

Oxytocin is a neuropeptide that is released when mothers interact with offspring and can decrease maternal anxiety-related behaviors. Critical parts of the brain's anxiolytic network are the periaqueductal gray (PAG) and adjacent dorsal raphe (DR), because blocking oxytocin receptors in these sites in postpartum rats increases anxiety. However, it is unclear if there are any reproductive state differences in oxytocin signaling in either region that could contribute to changes in maternal anxiety. To examine this, we used autoradiography to measure oxytocin receptor binding in the ventrolateral, dorsal, and lateral PAG and rostral, medial, and caudal DR across four reproductive states: diestrus virgins, pregnancy day 10, day of parturition, and postpartum day 7 (PPD 7). We found that in both the lateral and ventrolateral PAG, parturient dams had significantly more oxytocin receptor binding compared to diestrus virgins. In the rostral DR, parturient dams had significantly higher oxytocin receptor binding than both diestrus virgins and the PPD 7 dams. Parturient dams also had significantly higher oxytocin receptor binding than the diestrus virgins in the medial DR, but there were no differences in the caudal DR. In a second study, we quantified the length of oxytocin-immunoreactive fibers in the PAG and DR of diestrus virgins, parturient dams, and PPD7 dams. There were no significant differences in oxytocin fiber length across reproductive state. In conclusion, oxytocin receptors, but not oxytocin fiber innervation itself, are increased in recently parturient dams and may be related to the ability of oxytocin to alleviate postpartum anxiety.

THE EFFECTS OF NEONICOTINOID EXPOSURE ON BUMBLEBEE FORAGING AND MORTALITY RATES
Cristha Edwards (Spelman College)
Category & Time: Integrative Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 301
Mentor(s): Fred Dyer (Integrative Biology)

Neonicotinoid pesticides are widely a type of repellent often used in agriculture to protect crops from predation herbivorous by insects. Although this has been proven to be an effective mechanism to save crops it may have negative has had other effects on social flower-visiting insects necessary for pollination. This study focuses on the bumble bee *Bombus terrestrisimpatiens*. Previous literature has discussed the possibility of a decline in colony fitness and navigational success in social insectsbees that ingest pesticides or return it to the colony. The goal is to understand the effects of neonicotinoid exposure on the foraging success of the bumble bee. In order to analyze their behavior an observational study in which 16 8 control and 8 exposure pesticide-exposed tents colonies were set up for a period of two weeks. During that time bees were enclosed in the test and forced to feed on the food resources provided only with food from potted plants. Some of the trees and flowers were exposed to neonicotinoids while others were control. Daily counts were taken to observe the foraging behavior of the neonicotinoid exposed bees to the control group. At the end of the two weeks, the colonies will all be placed outside and allowed to forage freely. They will be monitored to measure colony growth and reproduction. As the research progresses there will be an analysis of the relationship between foraging behavior and mortality rates when exposed to neonicotinoid pesticides.

UTILITY OF *CAMPYLOBACTER JEJUNI INFECTED NOD MICE WITH HUMANIZED MICROBIOTA AS A GUILLAIN-BARRE MODEL*
Joe Faryean (Michigan State University)
Category & Time: Integrative Biology, Section 1, 1:00 PM - 2:15 PM
Poster: 302
Mentor(s): Linda Mansfield (Large Animal Clinical Sciences)

Campylobacter jejuni is a bacterial pathogen that has been linked with the neuropathy Guillain-Barré syndrome (GBS). GBS is an autoimmune disorder characterized by weakness of the limbs and ascending paralysis. The exact pathogenesis of GBS is unknown but it is thought that molecular mimicry between *C. jejuni* lipooligosaccharide structures and nerve cells gangliosides are a mechanism of anti-ganglioside antibody induction and nerve damage. We hypothesize that *C. jejuni* infected Non-Obese Diabetic (NOD) mice with humanized microbiota will produce more autoantibodies and more nerve lesions like those seen in humans with GBS compared to NOD mice with conventional intestinal microbiota. We examined the immune response of NOD mice with conventional intestinal microbiota or humanized intestinal microbiota given several different treatments: orally inoculated with TSB as a control, with *C. jejuni* strain 11168 or with *C. jejuni* strain 260.94. Mice were examined for a neurological phenotype and nerves from these mice were examined for lesions of GBS. The sciatic nerve, brachial plexus, and dorsal root ganglion were dissected, stained and examined for evidence of pathology. Nerve tissues were analyzed to determine if there was a difference in macrophage infiltration in mice with different microbiota and with different treatments. Counts ranged from 0.66 to 11.44 macrophages per 100,000 pixels squared in the dorsal root ganglia, but no significant differences were detected between treatment groups or microbiota groups based on one-way ANOVA. Available data suggests that we will reject the hypothesis that humanized microbiota exacerbates GBS in NOD mice.

EFFECT OF FEMALE REPRODUCTIVE STATE ON TYROSINE HYDROXYLASE IMMUNOREACTIVITY IN THE MIDBRAIN VENTRAL TEGMENTAL AREA AND DORSAL RAPHE
Kyra Hartley (Michigan State University)
Category & Time: Integrative Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 305
Mentor(s): Zachary Grieb (Psychology)

Dopamine release is critical for maternal behaviors in laboratory rats and mice, with elevated dopamine promoting licking and retrieval of pups to a nest site, and is released when dams interact with pups. However, there has been no analysis of whether dopamine cell number changes across reproduction, which could be expected since dopamine release is increased during maternal care in the postpartum period. To address this we will use immunohistochemistry to label cells expressing tyrosine hydroxylase, the rate-limiting enzyme for dopamine production, in two major dopaminergic populations in the midbrain, the ventral tegmental area (VTA) and dorsal raphe (DR) across reproduction in female rats (i.e. diestrus virgins, parturient dams, postpartum day 7 dams, and postpartum day 18 dams). The number of immunoreactive cells, as well as relative density of tyrosine hydroxylase immunoreactivity, will be quantified. We predict the VTA and the DR will show an increase in immunoreactivity in the VTA and DR during all lactation time points. Overall this data will support known increases in dopamine in early lactation, and suggest that increases in dopamine might be the result of increased numbers of dopamine cells. This would also imply that dopamine cells in the DR might play a more crucial role in maternal behavior than previously thought.

THE PREVALENCE OF TETB AND AADA1 ANTIBIOTIC RESISTANCE GENES IN THE INFANT MICROBIOME.
Breanna Kornatowski (Michigan State University)
Category & Time: Integrative Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 306
Mentor(s): Sarah Comstock (Food Science & Human Nutrition)

There are trillions of bacteria in the human gastrointestinal tract. When a person gets an infection, antibiotics can attack certain gut bacteria preventing them from surviving. While antibiotics are an excellent tool with which to treat infections, each antibiotic prescription also creates an opportunity for the gut bacteria to become resistant to that particular antibiotic, thus inhibiting the drug's ability to kill bacteria. This research determined the effects of successive antibiotic treatments early in life on the prevalence of antibiotic resistance genes (tetB,and aadA1) in the infant gut microbiome. First, DNA was extracted from longitudinal fecal samples of one infant. Then, quantitative real-time PCR (qPCR) was performed using the corresponding qPCR assay. The prevalence of aadA1 was negative in all longitudinal samples. The prevalence of tetB was positive in nine of twelve longitudinal samples. tetB is a bacterial gene which makes bacteria resistant to tetracyclines, the antibiotics typically used to treat urinary or respiratory tract infections. In addition, tetracyclines are commonly used in animals being raised for human consumption. Because of the qPCR results, the prevalence of the tetB resistance gene was then tested cross-sectionally in twenty-four different samples at six months of age. In the cross-sectional analysis, tetB was found to be positive in ten samples. These results indicate that tetB is present in human infants. Although we don't know the origin of this resistance, these results demonstrate that some intestinal bacteria are sensitive/resistant to tetracycline. It's important to educate the public about these consequences of antibiotic use.

THE IDENTIFICATION OF TRANSGLUTAMINASES IN PERIVASCULAR ADIPOSE TISSUE
Janae Lyttle (Spelman College)
Category & Time: Integrative Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 307
Mentor(s): Stephanie Watts (Pharmacology & Toxicology)

Norepinephrine (NE) is a signaling molecule of the sympathetic nervous system that functions to mediate many physiological processes throughout the body, including maintaining normal vascular tone. Transglutaminases (TGs) are a family of enzymes that act as a glue, forming a bond between a free amine group (e.g. lysine) on one molecule and a glutamine substrate protein. In the presence of TGs, NE can become attached to a protein in the process of amidation, a posttranslational modification that may alter the function of the protein. Because NE is located in the perivascular adipose tissue (PVAT) of blood vessels, we are curious if any of the eight mammalian TGs (TGs 1-7 and FXIII) are also present and actively functioning in PVAT. We hypothesize that TGs are found in the PVAT of rat arteries. To identify if any of the TGs listed above are found in PVAT, immunohistochemistry (IHC) will be performed on rat tissue samples from the aorta, superior mesenteric artery, and mesentery. IHC uses antigen and antibody interactions to identify if the proteins for the specified antigen are found in the tissue sample. After experimentation, we expect to find PVAT from all arteries to have TGs. Moving forward, the next step would be to test if the TGs identified in PVAT are functioning in the tissues in which they are found to see if they are altering the function of normal proteins in the PVAT.

ASSESSING THE RELATIONSHIP BETWEEN AQUATIC AND TERRESTRIAL ECOSYSTEMS: AN EXAMINATION OF THE SPIDERS OF THE CONTINENTAL UNITED STATES
Simone Oliphant (Florida International University)
Category & Time: Integrative Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 308
Mentor(s): Quentin Read (Forestry), Phoebe Zarnetske (Forestry)

Aquatic and terrestrial ecosystems are linked by matter, energy, and common organisms. This study focuses on spiders of the United States: as land predators of many aquatic organisms, spider biodiversity may be connected to the biodiversity of aquatic invertebrates. The research asks: Is there a relationship between riparian spiders' web shape and a climate response? What is the relationship between spider web diversity and prey diversity? This produces the hypotheses: Adjustments in the design and placement of orb webs and sheet webs lead

to these spiders being more common in locations that experience environmental stresses, such as wind and rain. Also, the diversity of web shapes of riparian spiders has a positive correlation with prey diversity within a habitat, with orb weavers being general predators. Methods include compiling data from published lists of spider species occurrences, literature searches using GBIF (Global Biodiversity Information Facility) and other databases to get information on spider traits. Additionally, publicly available remote sensing data will be used to acquire information on the state occurrences of species, with climate and environmental factors for these locations, along with compiled maps of terrestrial bird and aquatic insects to explore relationships between spider diversity and the diversity of their taxonomic groups interaction. This study entails constructing a database on spiders of the continental United States, with feeding and habitat traits information, which will be publicly available. This facilitates further research as studying spider diversity leads to increasing understanding of how understudied riparian zones operate and respond to change.

EVALUATION OF REPELLENT ACTIVITIES OF TWO ESSENTIAL OILS NORCAMPHOR AND THUJONE IN TWO DROSOPHILA SPECIES
Simon Sanchez (St Mary's University)
Category & Time: Integrative Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 309
Mentor(s): Ke Dong (Entomology), Qiang Wang (Entomology)

Essential oils derived from various plants have been shown to repel insects including flies and mosquitoes. Norcamphor and thujone are two essential oils that found, respectively, in the wood of the camphor laurel, a large evergreen tree found in Asia, and in several plants, such as the arborvitae, cypress, and wormwood. The objective of this study was to test the potential repellency of norcamphor and thujone against two species of the fruit fly, Drosophila melanogaster and Drosophila suzukii, D. melanogaster is a model insect and D. suzukii is an invasive pest known for its tendency to attack healthy, ripening fruit leading to crop loss and threatening fruit production. Electrophysiological recording experiments show that norcamphor and thujone activate specific olfactory neurons in both insect species. Preliminary T-maze behavioral assays showed that these two compounds exhibit repellency against adult flies. Findings from this study suggest that norcamphor and thujone are potent repellents that may be further evaluated to be incorporated as a strategy for D. suzukii control.

DEVELOPMENT OF VIVO-MORPHOLINO TECHNIQUES FOR GENE EXPRESSION KNOCKDOWNS IN WEAKLY ELECTRIC FISH
Cassandra Sarria (University of Central Florida)
Category & Time: Integrative Biology, Section 2, 1:00 PM - 2:15 PM
Poster: 310
Mentor(s): Savvas Constantinou (Integrative Biology), Jason Gallant (Integrative Biology), Nikki Robichaud (Zoology), Colin Diesh (Integrative Biology)

Vivo-morpholinos have been extensively used model vertebrate organisms; however, no protocol has been adapted for use in electric fish. The purpose of this study is to evaluate the efficacy of vivo-morpholinos on the knockdown of gene expression in weakly electric fish by targeting a sodium channel gene important in the generation of electric organ discharges (EODs). Scn4aa is homologous to the human gene Scn4a, which encodes the sodium channel Nav1.4, and is responsible for generating action potentials in muscle. In weakly electric fishes scn4aa expression is restricted exclusively to electric organs, where it is responsible for generating action potentials contributing to the EOD. Because scn4aa is expressed exclusively in the electric organ, and EODs are easily measured and quantified non-invasively, manipulation of scn4aa expression is ideal for developing this gene manipulation technique in adult electric fish. In this study, we recorded EOD behaviors for 2.5 minutes prior to treatment, and then divided the fish into experimental and control groups. Experimental fish received 17.5 mg/kg of splice-blocking morpholino targeting scn4aa, where control fish received 17.5 mg/kg standard morpholino control targeting human beta-globin. We first assessed vivo-morpholino effect on phenotype by comparing EOD amplitude post-injection to amplitude in baseline recordings. We also examined assessed whether scn4aa expression levels were lower in individuals that had reduced amplitude EODs using quantitative PCR.

THE EFFECTS OF DIESEL EXHAUST PARTICLES ON NEURAL PROGENITOR CELLS, THROUGH MARKERS OF NEURODEGENERATION, SUCH AS OXIDATIVE STRESS
Sera Sermet (Michigan State University)
Category & Time: Integrative Biology, Section 3, 2:30 PM - 3:45 PM
Poster: 313
Mentor(s): Colleen Hegg (Pharmacology & Toxicology)

Alzheimer's disease (AD) is the most prevalent incurable neurodegenerative disease. It's onset is a complex combination of environmental and genetic factors. Environmental pollutants, especially diesel exhaust particles (DEP), are detrimental to neurogenesis in the hippocampus, an area essential for learning and memory. Thus, may contribute to the onset of AD. Since half of the American population live in counties with harmful air pollution, we are interested in studying the effects of particulate matter on the brain. We hypothesize that exposure to DEP will cause changes in healthy brains through markers of neurodegeneration, such as oxidative stress; thus, inducing AD-like morphology. To approach this hypothesis, mice or neural progenitor cells derived from human induced pluripotent stem cells will be exposed for 2-5 days to diesel particulate matter or saline vehicle. After exposure, total RNA will be isolated from cells or hippocampal tissue. cDNA will be synthesized and quantitative real-time RT-PCR will be performed, examining gene expression of 84 genes regulated in response to stress and toxic compounds, using a RT2 profiler PCR array. We anticipate a stress pathway activated by DEP in normal humans and healthy brains will be identified. Future studies will investigate effects on progenitor cells from Alzheimer's patients. We aim to increase knowledge on the role of our ambient environments on the pathogenesis of AD. Since those who live in, or drive through traffic ridden urban areas are most susceptible. This knowledge can be used to better understand environmental health and create new preventative strategies against AD.

EFFECTS OF GLUCOCORTICOIDS ON MUCINS LEVELS IN THE SMALL AND LARGE INTESTINE
Allison Shinouskis (Michigan State University)
Category & Time: Integrative Biology, Section 3, 2:30 PM - 3:45 PM
Poster: 314
Mentor(s): Laura McCabe (Physiology)

Glucocorticoids are commonly prescribed clinically for their strong anti-inflammatory effects. Although effective at treating inflammatory diseases, glucocorticoids have a wide variety of side effects, such as modulation of the gut microbiome. Recent studies have shown glucocorticoids down-regulate mucin genes in the gut. It has been shown that the mucus layer, produced by goblet cells, is an essential element to the intestinal epithelial barrier. It is known that glucocorticoids affect mucins in the intestine however little is known about the effect glucocorticoids have on goblet cells. In the present study we examined changes to the small and large intestinal morphology, goblet cells and mucin cytokine gene expression under treatment with glucocorticoids. We also looked at the effect a mucus supplement (high molecular weight polymer MDY) would have on glucocorticoids induced intestinal changes. 16-week old C57/b6 mice were treated for 8 weeks with prednisolone (5mg 60-day slow release pellet) implanted subcutaneously behind shoulder. 1.25% MDY was given to mice during the duration of glucocorticoid treatment. Periodic acid Schiff and hematoxylin and eosin stain were used for goblet cell counts and morphological analysis. Consistent with literature, glucocorticoid treatment decreased expression of the main mucin gene (MUC2) in both sections of intestine compared to controls. Treatment with MDY prevented decreases in both sections. Interestingly, goblet cell number or intestinal crypt width did not change in the large intestine in either treatment group. These results suggest that while glucocorticoids do down regulate mucin genes, they don't seem affect goblet cells or intestinal morphology.

FROM THE SHADOWS OF THE SOUTHEAST: A POPULATION GENETIC PERSPECTIVE ON MYOTIS AUSTRORIPARIUS
Faith Ureel (Grand Valley State University)
Category & Time: Integrative Biology, Section 3, 2:30 PM - 3:45 PM
Poster: 315
Mentor(s): Amy Russell (Biology)

This project was undertaken to determine the population genetic differences between species of bats in North America that have experienced outbreaks of the deadly fungal disease, white-nose syndrome (WNS), and those that have not. While affected species, such as the little brown bat (Myotis lucifigus), have been widely studied, little is known about the population dynamics of many species that were, until recently, naïve to WNS, such as Myotis austroriparius, the southeastern bat. In order to forecast the impact WNS will eventually have on the southeastern bat, the genetic structuring and historical demography of a sample of 44 bats is currently being reconstructed. To this end, the population is being assessed at 15 microsatellite loci that were identified in other vespertilionid species belong to the genera Myotis and Corynorhinus, and were shown to work particularly well in the southeastern bat. The DNA for this analysis was extracted following the Qiagen DNeasy Kit Animal Tissue Extraction Protocol, and single-load PCR reactions for 52 loci were prepared. The literature protocols for each PCR load were followed with minor modification to load volumes. After all individuals have been genotyped, the multilocus data will be analyzed using Bayesian statistics to model changes in the southeastern bat's population and determine the extent to which genetic structuring is present. As a result of this study, bat conservation strategies will be better informed about the ways in which the southeastern bat may be affected by the WNS epizootic.

INVESTIGATING INTERACTIONS BETWEEN PLANTS, FUNGI AND INTRACELLULAR BACTERIA
Ana Vazquez (University of Puerto Rico at Mayaguez)
Category & Time: Integrative Biology, Section 3, 2:30 PM - 2:30 PM
Poster: 316
Mentor(s): Gregory Bonito (Plant, Soil, & Microbial Sciences), Alessandro Desiro (Plant, Soil, & Microbial Sciences)

Plants are host to thousands of fungi and bacteria, which constitute the plant microbiome and contribute to plant development, growth and resilience to stress. Mortierella is an early-diverging lineage of fungi that are common in soils and rhizospheres of diverse plants. Many Mortierella species host endobacteria including Burkholderia- and Mollicutes/Mycoplasma-related endobacteria. The function of Mortierella and its endobacteria in the plant microbiome remain unknown. The goals of this research are: (1) assess Mortierella diversity and its endobacteria; (2) determine the impact of different Mortierella species on plant growth and resilience to drought stress. We first isolated Mortierella from soil. To identify the fungi, ITS rDNA regions was amplified and Sanger sequenced. NCBI BLAST queries and phylogenetic analysis were conducted. Isolates were screened for the presence of endobacteria using 16S rDNA primers and PCR, and identified by sequencing. Endobacteria were cleared from their host with antibiotics. To assess impacts of endobacteria on their fungal host, cleared strains were grown for 16 days and dry biomass was measured. To assess impacts of fungi and endobacteria on plant growth isolates were inoculated onto Raphanus raphanistrum (radish) and Phaseolus vulgaris (bush bean). Above- and below-ground biomass was weighed and measured. Plants were exposed to severe drought and their photosynthetic efficiency was monitored. In this research 14 new isolates of Mortierella were obtained. Endobacteria were detected in two isolates (14%). One isolate of Mortierella appeared to improve the growth of bush bean. Impact of endobacteria on fungal host and plant-fungal interactions will be discussed.

SEARCH BEHAVIOR, DANCE BEHAVIOR AND THE ALLOCATION PROBLEM IN HONEY BEES
Joi Wright (Spelman College)
Category & Time: Integrative Biology, Section 3, 2:30 PM - 3:45 PM
Poster: 317
Mentor(s): Fred Dyer (Integrative Biology)

The honey bee, Apis mellifera, also known as honey bees forage to find the best food sources and resources that will benefit the colony. Foraging honey bees use dance communication to serve as instructions on the best quality food source to recruit bees who are looking to

begin their foraging experience. How will the colony readjust its allocation of foragers when food quality is changed, and how dance communication plays a role in that readjustment? Two foraging groups within the same colony will be trained to make foraging flights to two different feeders specific for that group. The feeders which serve as the food source will first contain the same amount of sucrose but one feeder will be manipulated while the other is kept constant. The main observations from this study would be to identify if there is a change in allocation of recruits in relationship with the dance communication being affected from food quality. The prediction of this study is that When one feeder is increased in value then brought down, then the foragers will have a decrease in dance communication because there is more exploration being done by these foragers to search for higher quality food. While this is happening the control group of honey bee foragers will have an increase in dance communication and in recruitment, although the sucrose levels were never changed. The reason for this is that bees returning from the control feeder should be able to unload their nectar loads quicker at the colony.

THE EFFECT OF CHRONIC CADMIUM EXPOSURE ON NRF2 TARGET GENES IN RAT SPLENOCYTES
Jamie Youngberg (Michigan State University)
Category & Time: Integrative Biology, Section 3, 2:30 PM - 3:45 PM
Poster: 318
Mentor(s): Cheryl Rockwell (Pharmacology & Toxicology)

Cadmium (Cd) is a toxic metal and carcinogen that is a common human exposure, often through the diet or workplace inhalation, with cigarette smoke constituting another source of exposure. The primary targets of cadmium toxicity are kidney and bone, with effects also seen on the immune and respiratory systems. The generation of cellular oxidative stress, such as reactive oxygen species (ROS), is considered to play a role in Cd toxicity, although the exact cellular mechanisms remain unclear. Nuclear factor erythroid 2 related factor 2 (Nrf2) is a transcription factor shown to play a protective role against cellular stress by regulating the induction of a number of antioxidant, detoxification, and other cytoprotective genes. Nrf2 is activated by compounds such as ROS, electrophilic xenobiotics, and toxic metals such as Cd. This project will investigate the effects of chronic Cd exposure on rat splenocyte expression of Nrf2 and Nrf2 target genes. Rats were provided 50 ppm Cd for 10 weeks in the drinking water. At 10 weeks exposure, splenocytes were isolated, immunophenotyped, examined for markers of oxidative stress, and collected for RNA. Here, mRNA will be extracted and converted to cDNA, followed by quantification of Nrf2 target genes by RT-qPCR. The results of this project will determine the effects of chronic Cd exposure on Nrf2 target gene activation.

ROLE OF NEUROTENSIN RECEPTOR-1 IN A RODENT MODEL OF ANOREXIA NERVOSA
Isaac Zin (Case Western Reserve University)
Category & Time: Integrative Biology, Section 3, 2:30 PM - 3:45 PM
Poster: 319
Mentor(s): Gina Leinninger (Physiology), Laura Schroeder (Physiology)

Individuals with anorexia nervosa (AN) restrict feeding and exercise in the relentless pursuit of thinness. While the pathogenesis of AN is multifactorial, resulting from a combination of genetic vulnerability, being of the female sex, pre-adolescent anxiety and an inciting weight loss event, predisposing genetic factors have yet to be defined. The recent discovery of AN patients with loss of function variants in genes for neurotensin (Nts) and neurotensin receptor-1 (NtsR1) suggests that disruption of NTS-NTSR1 signaling may confer genetic risk for AN. We are therefore studying NtsR1-null mice to determine whether genetic loss of NtsR1 increases vulnerability to develop aphagia. Preliminary data indicate that NtsR1-null female mice, but not males, preferentially develop aphagia, suggesting a gene-sex interaction. We are currently investigating whether NtsR1-null mice exposed to the full complement of AN risk factors are more susceptible to developing aphagia than mice with intact NtsR1. Additionally, we seek to determine if loss of NtsR1 disrupts neuronal activation in the nucleus accumbens (NA), a brain region that is targeted by NtsR1 neurons and which regulates motivated feeding and movement behavior. Assessing the amount of cFos (a marker of activated neurons) in the NA of control and NtsR1-null mice will identify whether genetic loss of NtsR1 disrupts the NA and whether this may be a site underlying the pathogenesis of AN. In sum, this work will provide insight into why individuals with genetic disruption of NTS-NTSR1 signaling develop AN and will suggest potential sites for intervention.

MECHANICAL ENGINEERING

SUPERCONDUCTIVITY IN FUTURE
Hadi Al Naji (Michigan State University)
Category & Time: Mechanical Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 322
Mentor(s): Katy Colbry (Engineering)

The most commonly used modern trains use diesel or electric locomotive to move trains with a huge engine. This makes trains operation more expensive and heavier. These trains use a railroad tracks composed of parallel steels with a fixed distance called gauge. The gauges are connected by sleepers of wood or concrete. This traditional method is energy consuming, time consuming (long trips), and polluted to the environment. Superconductive train present a promising solution for the disadvantage of trains. Maglev train uses magnetic levitation in order to make the train move with a high speed and without making any physical contact with the ground. It makes both left force and propulsion in order to make the train fly over the rail path. Moreover, the only major problem in Maglev trains is the construction cost. However, Maglev train has the potential to become cheaper in the future if new investment were to be made in a new guideway for a new Maglev train. The current common rail is not compatible with new developed trains that uses levitation in order for it to move. This requires billions of dollars for a new infrastructure. This research report will analyze the advantages, disadvantages and a future insight of the Maglev trains.

SCHLIEREN IMAGING AND SPARK-IGNITION SYSTEM FOR NEW CONSTANT-VOLUME VESSEL
Lauren Chance (Michigan State University)
Category & Time: Mechanical Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 323
Mentor(s): Berk Can Duva (Mechanical Engineering), Elisa Toulson (Mechanical Engineering)

Implementing a functional and efficient ignition system is vital before one is able to evaluate characteristics of actual combustion and engine performance given specific conditions and reactants. The purpose of this project was to set up and design an ignition system and rapid-imaging system that will be used in the near future to test flame characteristics and combustion reaction rates of alternative fuels and conventional fuel-air mixtures at lean conditions in a new constant-volume vessel. This research has vast applications in the transportation sector and can lead to better fuel economy, less harmful emissions, and higher overall engine efficiency on a large scale. The actual implementation of the new vessel and its data is not included due to the small time frame. The ignition system design used to supply energy to the new vessel will be outlined here, as well as set up and design of the Schlieren imaging Z-type system used to visualize the combustion process. Rationale behind design decisions, such as choosing a spark-ignition system, utilizing an inductive instead of a capacitive-based system, and choosing a Z-type Schlieren system with long focal length mirrors and small reflective angles will also be included. Subsequent testing data of the ignition system and imaging system will also be included (if time permits).

PULMONARY ARTERIAL HYPERTENSION: MODELING AND MECHANICS
Craig DeClerck (Michigan State University)
Category & Time: Mechanical Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 324
Mentor(s): Lik Chuan Lee (Mechanical Engineering)

Pulmonary Arterial Hypertension (PAH) is a disease that is associated with high blood pressure in the pulmonary arteries due to vasoconstriction. This disease leads to high stress levels within the right ventricular wall. Over a long period, this exertion of the right ventricular wall leads to many detrimental outcomes, including heart failure. When PAH is diagnosed with unknown cause, this disease is commonly referred to as idiopathic PAH (IPAH). There are currently no treatments for IPAH, which is due, in part, to our poor understanding of this disease. To better understand the ramifications of IPAH, we developed computational models of the biventricular unit using magnetic resonance (MR) images acquired from PAH patients of the National Heart Institute of Singapore. Each subject's biventricular unit was segmented from the MR images at equal spaced time-points in a cardiac cycle using the software MeVisLab (MeVis Medical Solutions AG). Geometrical models of the patient specific biventricular unit were then reconstructed from these segmented images. A mesh was created from each of these reconstructed geometries. This mesh was used to run a series of python scripts that perform hyperelastic warping to compute for radial, longitudinal, and circumferential strains. Strains computed from healthy subjects and IPAH patients were compared. The understanding gained in this research may help future development of a treatment for IPAH.

COMPARING THE FORCE REQUIRED TO OPEN A SURGICAL PACKAGE TO CONTAMINATION LEVELS
Jack Michalski (Michigan State University)
Category & Time: Mechanical Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 325
Mentor(s): Tamara Bush (Mechanical Engineering)

During the opening process of surgical packages a level of contamination occurs. A study was conducted with six different styles of packages and the contamination levels of each were measured after opening. A hypothesis was drawn that the higher the force required to open the packages lead to a higher contamination level. The purpose of this study is to test the six package styles used in that study, graph the force required to open each and examine if there is a connection between force exerted on the packages and contamination levels. This will allow professionals in the medical field to package equipment in a package based off of our results that will result in the least amount of contamination.

AN INTEGRATED MODEL OF THE HEART WITH DILATED CARDIOMYOPATHY, AORTIC AND MITRAL REGURGITATION, WITH THE HELP OF A LEFT VENTRICULAR ASSIST DEVICE WITH A PI CONTROL SYSTEM AND A SYSTEM BAROREFLEX
Josue Nataren (Michigan State University)
Category & Time: Mechanical Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 326
Mentor(s): Seungik Baek (Mechanical Engineering), Hamidreza Gharahi (Mechanical Engineering)

Heart Failure is a leading cause of death worldwide. The inability of the heart to pump enough blood decreases the oxygen available for the other parts of the body, therefore decreasing the body's performance and making a person feel tired or even fatigued. Left ventricular failure due to a decrease in contractility is one of the main causes of heart failure. Left Ventricular Assist Device (LVAD) that consists of a pump through which a continuous flow is from the left ventricle to the aorta are a promising field to help the heart patients recover from mild heart failure or even as an alternative option to heart transplant. Understanding consequences of implanting LVAD's for patient's health and improving their design are very important. Therefore, our aim is to develop a full cardiovascular circulation model coupled with LVAD and to simulate different cases: healthy, heart failure, right after LVAD, LVAD with regurgitation factors (both Mitral and Aortic regurgitation), suction events for the pump of the LVAD, a flow depending on the pump speed of the LVAD, and a pump flow controller based on the pressure differences. This model can help on determining what the best conditions for the LVAD's pump speed are depending on the level of the sickness so that patients can have a better quality of life depending on their specific cases.

FLOW RATE AND PRESSURE LOSS ACROSS VARIOUS AGRICULTURAL IRRIGATION SYSTEM COMPONENTS
Drew Roth (Michigan State University)
Category & Time: Mechanical Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 327
Mentor(s): Giles Brereton (Mechanical Engineering)

It is necessary for farmers to devise more efficient cultivating practices for fruit orchards of the future. Improving crop density, decreasing water waste, and limiting chemical use are three key areas to address. Experimental orchards have been integrated with advanced watering/pesticide dispersion systems in order to determine the feasibility of this practice against current methods. The ability to model these systems in order to design them for maximum efficiency depends on accurate pressure and flow information for the components used. Tests have been carried out in order to collect this information for various sprinkler nozzles, pressure regulating valves, and tubing commonly used in these applications. A rig was built in which liquid from a small pressure vessel was forced into a fixed piping setup and through an individual component. The pressure difference across the component was measured using a manometer, each run was timed, and the discharged liquid was collected in a bucket for weighing. The pressure difference and flow rate numbers were then compared to a baseline which was recorded when no testing component was in-line. The data collected from these tests will be inputted into pipe flow software and used to modify current designs and create more accurate models for future systems.

DEVELOPMENT OF ELECTROTHERMAL FLEXIBLE, STRETCHABLE, TRANSPARENT MEMBRANE HEATERS BY WEAVING METAL WIRE PATTERNS
Zirui Wang (Michigan State University)
Category & Time: Mechanical Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 328
Mentor(s): Junghoon Yeom (Mechanical Engineering)

A membrane heater is a device consisting of a thin wire pattern of conductive materials with a certain resistance, which converts electricity into heat. Such membrane heaters are widely used in virtually all areas requiring uniform heat generation. A flexible, stretchable, transparent membrane heater can further extend its utility to new application areas, which are previously impractical due to the limitation of the non-flexible, non-stretchable, opaque characteristics of the conventional heater substrate. In this work, we propose a novel approach to inexpensively creating a flexible, stretchable, and transparent heater membrane using a commercially available metal wire. Two substrates considered here because of their flexibility, stretchability and/or transparency are polyimide (PI) and polydimethylsiloxane (PDMS). In essence, the key idea is to sandwich a metal wire pattern between two membranes and bond the stack. As a polyimide substrate, we use a thin Kapton tape. For PDMS, we cast a thin layer of PDMS with various prepolymer-to-curing-agent ratios, which will drastically change the stretchability. There are two fabrication challenges are explored. First, a desired wire pattern needs to be created repeatedly, which requires some form of a template. We developed a wire weaving template using a 3D printer and small diameter pins. Depending on the maximum stretching amount and whether it is subject to uniaxial or biaxial stretching, the wire pattern needs to be carefully chosen. The fabricated heaters were tested using an IR camera. The heater performance has been characterized under various loading conditions.

SYNTHESIS AND FUNCTIONALIZATION OF GALLIUM NITRIDE NANOCRYSTALS FOR PHOTOLUMINESCENCE APPLICATIONS
Devinda Wijewardena (Michigan State University)
Category & Time: Mechanical Engineering, Section 1, 1:00 PM - 2:15 PM
Poster: 329
Mentor(s): Rebecca Anthony (Mechanical Engineering), Alexander Ho (Mechanical Engineering)

Gallium Nitride(GaN) is mostly used in its bulk form in solid-state photoluminescent devices such as Light Emitting Diodes(LEDs), with emissions in the blue/ultraviolet ranges. However, the emission properties of GaN nanocrystals could be tuned by varying their size, hence offering a greater degree of applicability in the visible spectrum of light. In addition, freestanding nanocrystals can be applied in many versatile device architectures that are prohibited by traditional wafer-based growth. Here, we synthesized and varied the size of GaN nanocrystals using a plasma reactor. The precursors used were Trimethyl Gallium, Ammonia and Argon gas. Nanocrystal size was altered by varying the reactor pressure, gas flowrates, and radio-frequency power. Nanoparticles were characterized using X-Ray Diffraction(XRD), Photoluminescence(PL) spectroscopy, Fourier Transform Infrared Spectroscopy(FTIR), Scanning Electron Microscopy(SEM) and Transmission Electron Microscopy(TEM). Our results indicated that there may be some surface-related defects that are hindering bright luminescence, and our research objective was to study the GaN nanocrystal surfaces and employ surface-functionalization via dispersal in solvents and reactions with ligands. First, we dispersed the nanocrystals in oleic acid to aid in solubility and luminescence via passive coating. PL readings were promising for solvent-based surface coatings. Next, we employed covalent surface modification using long-chain alkenes such as 1-dodecene and 1-decene. We characterized the resulting colloidal samples using PL spectroscopy and FTIR. We plan on broadening the types of functionalizing ligands for improving PL of these nanocrystals, and studying the reaction mechanism between the nanocrystals and ligands using nuclear magnetic resonance(NMR) and electron paramagnetic spin resonance(EPR).

PHYSICAL AND MATHEMATICAL SCIENCES

ELECTROCHEMICAL DETECTION OF SALICYLIC ACID IN THE BRAIN
Daniel Babayode (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 333
Mentor(s): Sandra McClure (Chemistry), Greg Swain (Chemistry)

Electrode fouling is an issue that occurs when attempting to identify salicylic acid electrochemically. This problem is serious due to the positive impact salicylic acid can have upon the body, such as preventing cancers, and diminishing the effects of neurodegenerative diseases. Electrode fouling due to adsorbed reaction product(s) occurs on sp2-bonded carbon electrodes, like glassy carbon. In this research project, we sought to answer the question, does electrode fouling occur on sp3-bonded carbon electrodes, like boron-doped diamond? Cyclic voltammetry was used with solutions of salicylic acid in 0.1 M phosphate buffer, pH 7.2. This electrochemical method was used to determine the oxidation peak potential, Epox, and the oxidation peak current, ipox, as a function of the salicylic acid concentration (1-1000 μM), scan rate (50-500 mV/s), and scan number at a given scan rate. In addition to studying the oxidation reaction at boron-doped diamond thin film electrodes, measurements were also made at nitrogen-incorporated tetrahedral amorphous carbon thin-film electrodes. It is hypothesized that a stable and sensitive oxidation response will be observed at both diamond and tetrahedral amorphous carbon electrodes with no surface fouling.

SYNTHESIS OF POLYHEDRAL OLIGOMERIC SILSESQUIOXANE CAGES WITH UNIQUE ORGANIC FUNCTIONALITY
Sophie Bedford (Central Michigan University)
Category & Time: Physical and Mathematical Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 334
Mentor(s): Jonathan Dannatt (Chemistry), Andre Lee (Chemical Engineering), Robert E Maleczka Jr (Chemistry)

Polyhedral oligomeric silsesquioxanes (POSS) are cage-like nanostrucutres that consist of an inorganic silicon and oxygen core with organic functionality at the corners. The organic group functionality can be used to incorporate the “cages” into polymers to be used as fillers. According to the literature these nanosized fillers are an important alternative to macrosize fillers, which often lead to desirable and undesirable properties, such as increasing stiffness but losing toughness. This project aims to find ways of synthesizing new POSS molecules in order to be used as polymer fillers that can enhance properties of polymers, such as strength, and heat resistance, without such a trade off. To accomplish this, greater variety of functional groups must have the ability to be introduced onto the cage in order to increase the usefulness of POSS cages. While synthetic routes to symmetrical cages are available, making these molecules asymmetric is more of a challenge. Synthesis of AB (asymmetric cages), and incorporation of new organic groups onto POSS cages is the main focus of this research. Incorporation of organic functionality that can be protected, such as amine groups, is being examined in order to allow for the addition of new organic groups to either side of the POSS cage to form an AB system. This presentation will focus on these syntheses of functionalized POSS molecules and their characterization.

COMPUTING WAVE FUNCTIONS OF NEUTRONS IN MULTICHANNEL COLLISIONS WITH NON-LOCAL POTENTIALS USING THE R-MATRIX METHOD
Joey Bonitati (Clemson University)
Category & Time: Physical and Mathematical Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 335
Mentor(s): Filomena Nunes (National Superconducting Cyclotron Lab)

The calculable form of the R-matrix method has been previously shown to be a useful tool in approximately solving the Schrodinger equation in nuclear scattering problems. We use this technique with the Lagrange-mesh method to solve for the wave functions of projectiles in multichannel collisions efficiently. We combine the Woods-Saxon potential, the Perey-Buck potential, and a nonzero coupling potential to computationally solve for the projectile wave function inside the channel radius. Parallel programming techniques are introduced to reduce the computation time required for collisions involving many channels. We conclude that the R-matrix method is an efficient method to predict the wave functions of projectile particles in nuclear scattering problems involving both multiple channels and non-local potentials.

EXPANDING THE ROLE OF C-N COUPLING REACTIONS: TARGETED SYNTHESIS OF NOVEL ANTIBIOTICS
Morgan Carpenter (Grand Valley State University)
Category & Time: Physical and Mathematical Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 336
Mentor(s): Matthew Hart (Chemistry)
The rise on antibiotic resistant bacteria has prompted the need for new antimicrobial agents. Linezolid, a member of the oxazolidinone class of antibiotics, was developed to target the bacterial ribosomal complex aiming to leave the human cells unaffected. However, within a year of its introduction resistance had already been detected. In an effort to increase the potency of Linezolid, we have designed novel analogs with increased hydrogen bonding sites. Our synthetic plan utilizes sequential copper-mediated coupling reactions. Herein we report our efforts towards expanding the role of C-N coupling reactions. Using a catalyst system of copper iodide, trans-1,2-diaminocyclohexane and dimethylformamide under 140°C we have mediated both Goldberg-type couplings and a Finkelstein reaction. These can be used to prepare compounds analogs to our Linezolid targets.

A COMPUTATIONAL MODEL FOR ANOMALOUS DIFFUSION IN BIO-TISSUES USING FRACTIONAL CALCULUS
Sean Connelly (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 337
Mentor(s): Mohsen Zayernouri (Computational Mathematics, Science, & Engineering)

Accurate biological models are valuable bases of comparison for data collected by medical devices, such as MRIs or X-Rays. The research done this summer is part of an ongoing project to obtain an accurate model of anomalous diffusion within the brain. Initially, we studied different mechanisms of heat transfer phenomena, including diffusion, convection, radiation, and generation. We then carried out the mathematical modeling of general heat transfer, employing the Fourier law, and solved the heat equation using the Finite-Difference Method, which is first-order accurate in time and second-order accurate in space. We performed sensitivity analysis of different mechanisms of heat transfer to identify the most pronounced effects in the application of one dimensional conductors. By employing non-Fourier (fractional-order) flux laws, we were able to generalize the existing model to a both time- and space-fractional equation amenable for describing anomalous diffusion using fractional calculus. We also extended our numerical scheme to treat time- and space- fractional derivatives. Ultimately, we examined our computational model for studying anomalous diffusion in brain tissues, incorporating MRI data to verify accuracy. The broader impact of this summer research is to develop data-driven diagnostic tools for identifying anomalous activities, such as tumors, in the brain.

VISUALIZING NUCLEAR REACTIONS
Jacob Crosby (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 338
Mentor(s): Betty Tsang (National Superconducting Cyclotron Lab)

The study of nuclear reactions involves detecting the production and motion of many nuclear particles emitted at the same time. A Time Projection Chamber (TPC) can be used to reconstruct a three-dimensional picture of these reactions by detecting and reconstructing the track of ionized electrons left by charged particles produced in the nuclear reactions, as they traverse the detector, similar to taking still photographs of the debris during an explosion. This project involves using events recorded with the SpiRIT TPC, which was built and developed at the National Superconducting Cyclotron Laboratory (NSCL) at Michigan State University (MSU) and operated at the Radioactive Isotope Beam Factory (RIBF) in RIKEN, Japan. The Unity platform is used to visualize the events recorded with this detector which sits in a magnetic field. The physics of the charged particle motion are modeled and reconstructed based on the operation of the TPC. The goal of the project is to visualize individual nuclear collision events as a movie or within virtual reality in a Google Cardboard app. In this poster, the current status of the project will be presented, along with a demonstration of the model capability using the Unity platform. This work is supported by the U.S. Department of Energy under Grant Nos. DE-SC0014530, DE-NA0002923 and NSF Grant No. PHY 1565546.

DECOMPOSING THE DYNAMICS OF CIRCUMGALACTIC GAS WITHIN ASTROPHYSICAL SIMULATIONS
David Crowe (Texas State University)
Category & Time: Physical and Mathematical Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 339
Mentor(s): Brian O'Shea (Computational Mathematics, Science & Engineering)

The typical perception of a galaxy portrays a photogenic disk, however, there exists a much larger volume of surrounding diffuse gas known as the circumgalactic medium (CGM). The notion that this halo plays a vital role in galactic development has only recently been posited. As our ability to observe this diffuse material progresses, a greater need to analyze these data emerges. Using post-processing tools on data generated by astrophysical simulations, we examine the dynamical nature of these gaseous halos to investigate its role in how galaxies regulate themselves. We further probe the influence of the CGM and cosmological phenomena like star formation and cosmic rays to ultimately assess the validity of our idealized cosmological simulations.

PATH TOWARDS THE CHEMICAL SYNTHESIS OF CHONDROITIN SULFATE PROTEOGLYCANS
Jordan Davoll (University of West Georgia)
Category & Time: Physical and Mathematical Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 342
Mentor(s): Xuefei Huang (Chemistry), Sherif Ramadan (Chemistry)

Alzheimer's is a neurologically degenerative disease that affects about 5.4 million US citizens. Being such a devastating mental illness, understanding the cause or causes of this disease is of the utmost importance. While not everything about this disease is known, one hallmark of Alzheimer's disease is amyloid beta plaque aggregation. This plaque is highly toxic to cells in the brain. Furthermore, it is known to have interactions with proteoglycans; it has the most significant interactions with the chondroitin sulfate proteoglycans (CSPG). CSPG acts as a stimulant in the formation of amyloid beta plaque, potentially creating a feedback loop to promote the formation of even more plaque. In order to be able to inhibit this activity, the relationship between the structure of CSPG and the amyloid beta plaque must be understood. The difficulty in this arises from the fact that the glycan chains of CSPG are not directly controlled through genes, so those isolated from nature are extracted in heterogeneous mixtures. Having access to well-defined CSPG variants is extremely important, yet no scientific labs have been able to come up with a synthetic strategy for homogenous CSPG samples. The goal of this project is to synthesize a library of the 16 different CSPG variants, and quantify their binding affinities with amyloid beta plaque in order to better understand the relationship between the structure and function of CSPG.

THE SYNTHESIS OF NOVEL ANTIBIOTICS: DIPHENYLUREAS
Phillip Dietz (Grand Valley State University)
Category & Time: Physical and Mathematical Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 343
Mentor(s): Matthew Hart (Chemistry)

The fight against infectious disease is ongoing and shows no signs of having an end. Antibiotics are the primary tool used to treat infections, but their effectiveness is decreasing due to the rise of resistant strains of bacteria. With growing resistance, it becomes more and more difficult to treat even common diseases. This makes developing new antibiotics a crucial piece of fighting infections. Recently our lab has discovered a family of antibiotics based on a diphenyl urea scaffold. This projects' goal is to develop a structure activity relationship (SAR) for these compounds to identify the biologically relevant groups. To date, the focus has been on the synthesis of precursors to these molecules and optimizing the chemistry of the overall synthesis. Variability in these molecules will come by using different ester groups on the structure, by altering the size and shape of the ester chain we hope to develop an SAR for this functionality. Herein, we report the synthesis of the requisite esters and their transformation into the diphenyl urea targets. Moving forward, the completed ureas will be tested with a disk diffusion test to determine antibiotic activity.

INSTALLATION OF AN IODINE SATURATION SPECTROSCOPY SYSTEM FOR LASER FREQUENCY MEASUREMENT
Nathan Everett (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 344
Mentor(s): Kei Minamisono (National Superconducting Cyclotron Lab)

Collinear Laser Spectroscopy experiment is performed at the BECOLA facility at the National Superconducting Cyclotron Laboratory (NSCL) to further our understanding of nuclear structure of radioactive rare isotopes. Laser light and rare isotope beams are overlapped collinearly; resonant fluorescence is detected as a function of laser frequency. An atomic hyperfine spectrum is measured, from which nuclear information can be deduced. Precise measurement of laser frequency is required for this extraction since the nuclear effect in the hyperfine spectrum is very small. In order to achieve a precise calibration of our laser frequency, a well-known transition in iodine molecule can be used in turn. I am responsible for the installation of a saturation laser spectroscopy system for iodine, which enables determination of the resonance frequency of an iodine transition with high resolution. I plan to perform calibration runs to precisely determine laser frequency, which will be essential for radioactive Ca isotopes experiment scheduled in this summer. Details of the system and results of frequency calibration will be presented. This work is supported in part by NSF grant PHY-15-65546.

A PROXIMAL-GRADIENT METHOD WITH NETWORK INDEPENDENT STEPSIZES FOR SOLVING DECENTRALIZED OPTIMIZATION PROBLEMS
Katrina Gensterblum (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 345
Mentor(s): Zhi Li (Computational Mathematics, Science & Engineering), Yuying Xie (Statistics & Probability), Ming Yan (Computational Mathematics, Science & Engineering)

Decentralized optimization problems containing smooth and non-smooth terms have originally been solved using fixed stepsizes for fast performance with inaccurate results, or diminishing stepsizes for accurate results with slow performance. Previous algorithms, such as PG-EXTRA, use a proximal-gradient method to get accurate results with fixed stepsizes, while the stepsize depends on the network topology. The new method uses a similar proximal-gradient algorithm, but allows the algorithm to use independent step-sizes, and the stepsize does not depend on the network topology, thus allowing for even faster performance. This method also achieves linear convergence, in the case only smooth terms are present, to produce accurate results with the expedited performance. This method can be used in many situations including hospital information networks and power company information control.

THERMODYNAMICS OF THE CIRCUMGALACTIC MEDIUM
Austin Gilbert (Georgia Tech)
Category & Time: Physical and Mathematical Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 346
Mentor(s): Brian O'Shea (Computational Mathematics, Science, & Engineering)

Evolution of galactic structure is intimately connected to the star formation rate of the galaxy of interest, but the mechanisms regulating this quantity are not all clear. Based off of theoretical considerations of thermal instability, we examine global thermodynamic properties of the circumgalactic medium in real space and phase space as well as their correlation to the star formation rate for a number of highly resolved simulations with slight differences in bulk galactic properties for evidence of a precipitation feedback mechanism. Utilizing specialized post processing tools, we are also able to generate mock observations of absorption spectra from background quasars and examine which atomic species are well correlated to the thermodynamic properties of the circumgalactic medium.

EFFECTS OF GAS DOPING ON BI2SE3 DENSITY OF STATES
Ashlee Gordon (Spelman College)
Category & Time: Physical and Mathematical Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 347
Mentor(s): Eric Goodwin (Physics & Astronomy), Michael Gottschalk (Physics & Astronomy), Stuart Tessmer (Physics & Astronomy)

Quantum information has been used to store data for years, but theories concerning quantum computing are becoming more interesting to scientists as technology becomes increasingly important for handling large numbers and encrypting data like credit card numbers over the internet. Physicists suspect that topological insulators (TI) are the gateway in to quantum computing. TIs are recently discovered semiconductors whose electrical properties are still being studied, but have distinct and useful electrical properties from other semiconductors because they have electronic bands in the energy band gap. Previous studies using Scanning Tunneling Microscopy (STM) to track changes in the electrical properties of topological insulators provided empirical evidence for the insulating bulk states and conducting surface states predictions of the quantum-Hall effect. If the electrical properties of TIs can be modified through different processes like gas doping, TIs will be further utilized as ideal candidates for quantum computing and spintronics. This project uses STM to explore changes in the electrical properties of Bi2Se3 (a TI) due to nitrogen gas doping. The STM data provides topography and spectroscopy. The topography shows where conduction occurs on the material. The spectroscopy will potentially show major shifts in the Dirac cone (a characteristic feature in topological insulator density of states) as a function of energy. It is predicted that doping with Nitrogen gas will show significant shifts in the density of states of Bi2Se3, thus supporting claims that the electrical properties of topological insulators can be changed through gas doping.

ANALYZING MINDSET IN INTRODUCTORY COLLEGE PHYSICS
Abigail Green (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 348
Mentor(s): Vashti Sawtelle (Physics & Astronomy)

Mindset, an area of research in psychology, focuses on beliefs about intelligence and how these beliefs affect how students respond to different challenges. A fixed mindset is the belief that intelligence is fixed in quantity and cannot grow, while a growth mindset suggests that one can gain intelligence. Within the literature on mindset, undergraduate physics is an understudied area. In this study, we focus on bioscience students taking an introductory physics course who are co-enrolled in a time-intensive semester-long biomedical physics project. Psychological approaches to research on challenge have typically involved bringing individuals into a clinical lab to work on difficult math or logic problems. Our research takes us out of the clinical setting and focuses on challenges that students encountered during both physics class and the project. In doing this real-world research, we developed a new set of methodologies where the challenges and responses are identified and then coded. In this poster, we present analysis of end-of-semester interviews, in which students were asked to reflect on both difficulties and proud moments. Using a coding scheme developed from prior work, we analyzed these interviews for evidence of what defines a challenge and the response to challenge. The response to challenge was then coded as either signifying a fixed mindset or growth mindset. Preliminary analysis of interviews with three students suggests that a response to challenge does not always have strictly a growth or a fixed mindset, but rather they can have a mix of the two.

ELECTROANALYTIC DETECTION OF NITRIC OXIDE IN AN EXHALED BREATH USING NAFION COATED BORON-DOPED-DIAMOND/PLATINUM COMPOSITE ELECTRODES
Tiara Hinton (Morgan State University)
Category & Time: Physical and Mathematical Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 350
Mentor(s): Kirti Bhardwaj (Chemical Engineering & Materials Science), Greg Swain (Chemistry)

Nitric oxide (NO) in exhaled air is a biomarker of respiratory inflammatory diseases such as lung cancer, asthma, and chronic obstructive pulmonary disease (COPD). It can be qualitatively and quantitatively detected by electrochemical methods. The goals of this work are to develop, calibrate and validate electrochemical sensors for noninvasive monitoring of NO. The electrochemical sensor uses boron-doped diamond as a platform for its inertness and low background current. Nanoparticles of platinum are electrodeposited on diamond to lower the potential required for NO oxidation. An anionic polymer, nafion is coated on the sensor to reject interfering anionic species like nitrite ions, ascorbic acid, dopamine, and uric acid. The thickness of the coating will be optimized for sensor's high selectivity and low response time. A series of voltammetric and amperometric measurements will be made to determine the figures of merit in standard solution like sensitivity, selectivity, limit of detection, and stability. Linear sweep voltammetry will be used to study concentration dependent response of NO and interfering species. The gained knowledge will likely aid in the development of improved point-of-care noninvasive diagnostic tools required for respiratory diseases.

UNDERSTANDING THE ROLE OF ALCOHOL IN THE SYNTHESIS OF DEXTRAN-SILICA NANOPARTICLES FOR SIRNA DELIVERY.
Aaliyah Jeter (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 351
Mentor(s): Olivia Chesniak (Chemistry), Milton Smith (Chemistry)

A modified version of the Stöber method, which includes dextran, was used to produce silica nano-particles for siRNA delivery. When dextran is incorporated into silica nano-particles, an enhancement of cellular uptake and silencing is observed. The effects different alcohols have on the synthesis of silica nano-particles has already been widely studied. This work probes the role of dextran in the assembly of silica

nano-particles. This has been accomplished by varying the structure and polarity of alcohols used in the synthesis of dextran-silica nano-particles. The solubility and aggregation of dextran has been studied using dynamic light scattering (DLS), while the nano-particle size and morphology is observed via transmission electron microscopy (TEM). It is hypothesized that multiple variables are involved in the synthesis of dextran-silica nano-particles, including time, the polarity and sterics of solvents, solubility and aggregation of dextran and the hydrolysis and condensation of silane precursors.

RECONSTRUCTION OF NEUTRINO INTERACTIONS
Lonsani Kabba (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 352
Mentor(s): Tyce DeYoung (Physics)

Neutrinos come from many different sources such as the sun, cosmic rays, dark matter clusters, and even dwarf stars. Interestingly, neutrinos do not readily react with other particles while traveling from their source position to their finals destination, contrary to most particles. The high energy neutrino physics field was created to answer the difficult questions we have about the universe. However, there are little optimized techniques to trace these unique particles and answer tough question physics questions. We hypothesis that the use of the Ice Cube Neutrino (ICN) detector and it's optimization can help the physics field understand high energy neutrinos habits and source. To test this hypothesis, we will use the ICN detector located in the South Pole which is about 1.5km below a sheet of ice accompanied with digital optical modules (DOMs). The DOMs illuminates when a neutrino passes through the sheet of ice, directly correlating to the energy level of the passing neutrino. The emitted light from the DOMs interacts with protons to release luptons and these luptons attach to photons. This reaction causes Cherenkov's light which is what the DOMs detect. By utilizing the Cherenkov's light theory, we can standardize our high energy neutrinos recordings and then analyze the data using Linux and Python in conjunction with each other. From these observational results, we will be able to accurately quantify and observe characteristics of the high energy neutrinos to decipher the conservation of energy in the universe.

LASER LIGHT TRANSPORT FOR LASER SPECTROSCOPY EXPERIMENTS AT BECOLA
Colton Kalman (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 353
Mentor(s): David Garand (National Superconducting Cyclotron Lab), Jeremy Lantis (National Superconducting Cyclotron Lab), Kei Minamisono (National Superconducting Cyclotron Lab)

The BEam COoling and LAser spectroscopy (BECOLA) facility at NSCL at MSU is a facility where collinear laser spectroscopy is performed to explore nuclear structure of radioactive rare isotopes. A new pulsed laser system was recently acquired, which will be installed in a room approximately 20 meters from BECOLA and requires a laser light transport system. Transportation of light in conduits using mirrors is considered, which will be installed at a height of 3 meters from the floor to be isolated from the rest of the room for safety. Floor vibrations can lead to large displacements of laser light, due to the height of the mirror mount and the long distance of transportation, which has to be minimized. I am responsible for characterizing the floor vibrations by an accelerometer and measuring laser spot movement by CCD camera for various mirror stand configurations, including construction, material and weight distribution. I will discuss results of the measurements and the way to mitigate the effect of floor vibrations. This work is supported in part by NSF grant PHY-15-65546 and U.S. DOE grant DE-NA0002924.

HIGH SCHOOL STUDENTS CONCEPTIONS OF KINETIC AND POTENTIAL ENERGY
Cole Lacey (Michigan State Univeristy)
Category & Time: Physical and Mathematical Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 354
Mentor(s): Alicia Alonzo (Teacher Education)

Students do not enter classrooms as "blank slates." Because prior experiences and current ideas influence learning, teachers' instruction can be more effective if they understand how their students are already reasoning about a topic. To help teachers both predict and elicit their students' current reasoning, researchers articulate learning progressions (LPs)—"descriptions of the successively more sophisticated ways of thinking about a topic that can follow one another as children learn" (National Research Council, 2007, p. 219). An important part of the work to develop LPs is to document students' different ways of thinking. This project focuses on high school physics students' understandings of the nature of kinetic and potential energy. This research is part of a larger effort to iteratively develop and refine learning progressions for high school physics. LPs were used to write assessment items designed to elicit students' understanding relative to the LPs, and students at 6 local high schools responded to the items. At each school, a subset of students were interviewed to explore their responses to the assessment items. In this project, I am analyzing video-recordings of interviews and written responses to open-ended assessment items to identify different ways that students seem to conceptualize kinetic and potential energy. By further identifying typical ways of thinking that teachers are likely to encounter in their classrooms, this research will help to better prepare teachers to support their students' understandings of more advanced concepts, such as energy conservation and transfer.

EFFICIENCY ASSESSMENT OF NUMERICAL FRACTIONAL MODELS IN R
Songhao Li (University of California Berkeley)
Category & Time: Physical and Mathematical Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 355
Mentor(s): Mohsen Zayernouri (Mechanical Engineering)

Fractional partial differential equations (FPDEs) are increasingly popular in computational engineering because they can capture the memory-dependent, non-local behavior of anomalous phenomena. However, numerical solutions of FPDEs can be taxing, computationally; thus, an accurate yet efficient algorithm is crucial for effective model evaluations. R is selected as the coding platform for this analysis because of the need to compare model predictions against large sets of observable data. To understand the algorithms' designs and coding strategies in R, linear fractional ordinary differential equations (FODEs) are solved employing Petrov-Galerkin Spectral Method (PGSM) [1][2], Finite Difference Method (FDM) [3][4], and Finite Element Method (FEM) [5]. Moreover, we examine the performance of the aforementioned methods in the context of highly anomalous materials such as long-memory dependent visco-elastic tissues. The efficiency of each numerical scheme is assessed by examining their implementation time, computational cost, and rate of convergence. Subsequently, this assessment framework will be generalized to FPDE solvers for anomalous diffusion in bio-tissues. This summer project forms a building block for developing efficient data-driven-frameworks for anomalous transport, in which the complete cycle of data analysis, modeling, and simulation can be performed in an integrated fashion in R.

PROFILE MONITOR SCATTERING AND EMITTANCE GROWTH IN ION BEAMS WITH NON-RELATIVISTIC VELOCITIES
Jorge Mateus (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 359
Mentor(s): Steven Lidia (Facility for Rare Isotope Beams)

Beam profile monitors are essential diagnostic tools utilized in particle accelerators. Scanning-wire-type profile monitors are placed in series along a beam line to observe the particle beam, providing the essential information to tune and to operate the particle accelerators. Every measurement done by these tools may affect the underlying beam distribution, which then affects further transport, and measurement, due to single and multiple coulombs scattering taking place in the wire scanner of the Profile Monitors. Through a series of computer simulations using SRIM, and Geant4, it is possible to look at the scattering pattern of the ions in the 12KeV—20 MeV/nucleon range, from 100–300 um diameter Tungsten wires, and find an approximation of the angular deviation of these particles from their initial trajectory. Using both single and multiple scattering theories, it is possible to predict the change in the angle of these particles, and compare the results to the values obtained through the simulations. This will determine how much the emittance profile of the particle beam has grown after every measurement, and allow us to determine how many measurements we can perform on the beams simultaneously without affecting the quality of the beam to a considerable extent. Results of these calculations are expected to be minimal because particle deflections happen in very small angles.

EFFECTS OF DEEP SLOW BREATHING ON PAIN TOLERANCE
Katy McCarthy (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 360
Mentor(s): Erica Wehrwein (Physiology)

Deep slow breathing (DSB), such as Lamaze for childbirth, is taught as a pain management technique. Through an unknown mechanism, DSB causes a decrease in sympathetic activity, allowing parasympathetic activity to predominate. This results in slowing of the heart rate and vasodilation of peripheral blood vessels. However, it was previously unknown whether DSB can actually increase the amount of time pain may be tolerated. The focus of this study is to assess changes in autonomic nervous system function while participating in DSB when exposed to a painful stimulus. The amount of time a pain was tolerated with each breathing condition was also observed. A Cold Pressor Test was used to induce pain while subjects participated in a normal and a DSB trial. This test is used to assess autonomic nervous system function and consists of a bucket of ice cold water and a subject's hand, allowing for examination of their response time and intensity. Under these conditions, sympathetic activity is expected to predominate resulting in an increased heart rate and vasoconstriction of peripheral blood vessels. The body's response to DSB is expected to oppose its response to the Cold Pressor Test. Additionally, DSB may also play a role in distracting the individual, increasing their pain threshold. DSB resulted in a significant lengthening of time the hand was submerged (106.7 sec for normal vs 165.5 for DSB, $p<0.05$). This research is clinically relevant as DSB may be a potential treatment to manage pain.

BORON-DOPED DIAMOND CARBON PASTE ELECTRODES
Sandra McClure (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 361
Mentor(s): Romana Jarosova (Chemistry), Greg Swain (Chemistry)

This research project is focused on evaluating the electrochemical properties of carbon paste electrodes formed with glassy carbon powder and glassy carbon powder modified with an overlayer of boron-doped ultrananocrystalline diamond. This was accomplished by studying the electrochemical response of the different powders using different redox systems in aqueous and ionic liquid media. The presentation will report on the designs of the different paste electrode architectures, cyclic voltammetric studies of the different redox system behavior, Raman spectroscopy to investigate the carbon powder microstructure and SEM to determine the powder morphology. The boron-doped ultrananocrystalline diamond overlayer is formed by subjecting the glassy carbon powder to a microwave plasma consisting of 1% CH4/Ar

plus 10 ppm B for doping. The core-shell approach imparts the unique properties of diamond (wide potential window, excellent microstructural stability and weak molecular adsorption) to the substrate powder. Furthermore, the advantages and disadvantages of each material and each proposed electrode body will be addressed. This can be accomplished by looking at the large scale application of boron-doped diamond carbon paste electrodes.

DIVERGENT TOPOLOGIES IN ZINC AND CADMIUM SUBSTITUTED ISOPHTHALATE COORDINATION POLYMERS CONSTRUCTED FROM LONG-SPANNING DIPYRIDYLAMIDE LIGAND PRECURSORS
Abigail Meyers (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 362
Mentor(s): Robert LaDuca (Chemistry)

Crystal structures made up of inorganic metallic elements combined with organic connections and acids are created under high pressure in hot water. This is called hydrothermal synthesis. With slightly differing reactants, they result in original compounds that possess different shapes, connections, and topographies. The structures also vary in dimensionality. The crystal function is unknown when first putting the ingredients together, but analyzed after filtration through a series of tests. Hydrothermal reaction of zinc or cadmium nitrate, a 5-position substituted isophthalic acid, and the long-spanning dipyridylamide ligand 1,6-hexanediaminebis(nicotinamide) (hbn) resulted in coordination polymers whose dimensionalities depend on the nature of the ring substituent and the metal coordination environment. The new phases were characterized by single crystal X-ray diffraction. {[Zn2(hip)2(H2O)2(hbn)]·2H2O}n (1, hip = 5-hydroxyisophthalate) shows a 1D ladder topology with [Zn(hip)(H2O)]n uprights spanned by disordered hbn rungs. (2, tbip = 5-tert-butylisophthalate, nic = nicotinate) shows trimeric [Zn3(OCO)2] clusters connected into a 3D 8-connected 42464 bcu net by tbip and in situ generated nic ligands. (3, mip = 5-methylisophthalate) manifests a 2D (4,4) grid topology based on linked dimeric [Cd2(OCO)2] units. Luminescent properties and nitrobenzene detection capability were probed.

HYDROLYSIS AND DISPROPORTIONATION OF LIGNIN BY NOVEL SOLVENT FOR MORE EFFICIENT BIOMASS CONVERSION
Ellis Moore (Purdue University Northwest)
Category & Time: Physical and Mathematical Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 363
Mentor(s): James Jackson (Chemistry), Mikhail Redko (Chemistry)

Petroleum is the basis for today's chemicals and liquid fuels. Processing and combustion of this finite fossil resource adds the greenhouse gas, carbon dioxide (CO_2), to the atmosphere. To reduce net CO_2 emissions, biomass, the sole source of renewable carbon, is under active study as a replacement for petroleum. To enable processing, biomass is typically liquified to "bio-oil" by fast pyrolysis (rapid heating to 500-600 °C without oxygen). However, the high energy intensity of pyrolysis and related biomass conversions offsets the benefits of shifting to renewables. An alternative approach is saturation of biomass with a water/solvent mixture and heating to 150-200 °C to hydrolyze the lignin fraction, breaking it down to small-molecule aromatic fragments. The resulting dissolved lignin digestate can then be extracted from the cellulosic solids by filtration and converted to cyclohexanone via Ni-catalyzed disproportionation. This process depolymerizes lignin's complex structure without harmful solvents at modest energy intensity. Optimization of the phase separation characteristics of novel solvent-water mixtures enables efficient hydrolysis and solvent recovery. Recovered solids contain mostly cellulose and hemicellulose with potential as fermentation feedstocks. Mechanistic details are unknown, but Nuclear Magnetic Resonance (NMR) spectra suggest that catalytic disproportionation of the depolymerized lignin does form the expected cyclohexanone products. Such intermediates, produced from renewable biomass by hydrolysis and disproportionation, may in turn be converted via conventional processes into polyethers and nylons, products made today from petroleum.

DESIGN OF COMPENSATION COILS FOR THE TRANSPORT OF POLARIZED NUCLEI
Gabriel Moreau (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 364
Mentor(s): Oscar Naviliat-Cuncic (Physics & Astronomy)

This work reports about magnetic field calculations performed in the context of an experiment that will be performed at the National Superconducting Cyclotron Laboratory. The experiment will measure the beta decay asymmetry from polarized 36K and 37K nuclei. The setup will use a new polarimeter that will be installed at the end of the BEam COling and LAser spectroscopy (BECOLA) low energy beam line. The radioactive elements, in atomic form, will be polarized at BECOLA using laser techniques and the atoms have to be transported to the polarimeter with minimal polarization losses. The motivation for the magnetic field calculations was the design of simple compensation coils that should serve two independent purposes: 1) some coils are needed to compensate the stray magnetic field of the polarimeter magnets at the level of BECOLA so that the production of polarization is not strongly perturbed; 2) other coils are needed to suppress low field regions in the transport to the polarimeter, where the polarization can be destroyed. The status of the calculations and of the design work will be presented.

INVESTIGATING THE LIGHT INVERSION ISLAND OF ^{9}HE
Gerard Owens-Fryar (Rensselaer Polytechnic Institute)
Category & Time: Physical and Mathematical Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 365
Mentor(s): Dayah Chrisman (Physics & Astronomy), Micheal Thoenessen (Physics & Astronomy), Daniel Votaw (Physics & Astronomy)

This project will explore the possibility of the isotope ^{9}He existing in a light island of inversion. We hypothesize that the ground state prediction of ^{9}He from the nuclear shell model will correspond the measured first excited state, meaning that the isotope is in an inversion island. In order to examine this, ^{9}He will be created and analyzed. The ^{9}He will be produced through two methods. The first is a 12 hour double proton knockout using ^{11}Be. The second is 30 hour triple proton knockout using ^{12}B. Both of the beams will be incident on a ^{9}Be target. The ground and first excited states of ^{9}He will be measured using the Modular Neutron Array (MoNA), the Large multi-Institutional Scintillator Array (LISA), and Sweeper setup at the National Superconducting Cyclotron Laboratory (NSCL). Raw analog signals will be run through a Constant Fraction Discriminator (CFD) to remove noise. The signal received will be put through a Time to Digital Converter (TDC) and a Charge to Digital Converter(QDC), and then run through several logic gates. The digital data will be introduced as histograms with the SpecTcl software, and analyzed with with Root v.11. Root is a C++ based data analysis software. The information gained will assist in filling in the chart of nuclides and isotopes as well as developing a better model of nucleus structure and behavior. By investigating the properties of ^{9}He, we could impact technology, medicine, and clean energy fields.

CONTROL OF CATENATION AND CHIRALITY IN COBALT AND CADMIUM CAMPHORATE COORDINATION POLYMERS
Jack Przybyla (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 369
Mentor(s): Robert LaDuca (Chemistry)

Metal ions are capable of complexing with organic ligands, thus forming crystalline solids with a number of potentially interesting and useful properties. Salts containing cadmium, copper, cobalt, and zinc were complexed with D-camphoric acid and a collection of organic diamine ligands during chemical reaction in a high-pressure, aqueous environment. The resulting crystals were then analyzed with x-ray crystallography to determine their structure, molecular make-up, and lattice topology. Infrared spectrometry and thermogravimetric analysis were used to further characterize novel crystals. Fluorescence spectroscopy was also used on select cadmium crystals in order to determine their ability to detect explosive nitroaromatic molecules. The results revealed that both zinc and copper, while reactive with the organic ligand series and camphorate, generated polycrystalline products that were of too poor quality for rigorous analysis. Both cadmium and cobalt were much more promising, forming high quality polycrystalline products with a large fraction of the diamine ligand series. The resulting crystals, all previously uncatalogued, demonstrated a variety of topologies ranging from linear to self-penetrating three-dimensional. Additionally, a completely novel topology was found in the structure of a select cadmium sample.

TESTING THE VIABILITY OF NITROXIDE RADICALS AS REDOX SHUTTLES IN QUANTUM DOT SENSITIZED SOLAR CELLS
Christopher Riley (Seattle University)
Category & Time: Physical and Mathematical Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 370
Mentor(s): Remi Beaulac (Chemistry), Chenjia Mi (Chemistry)

Producing energy from clean, renewable sources, such as solar power, is a critical goal for our modern world. However, photovoltaic technologies are currently limited by low efficiency or prohibitive costs. Quantum dot sensitized solar cells (QDSSCs) are potential stable and cost-effective devices capable of surpassing the efficiency limit of traditional solar cells. Quantum dots (QDs) are inorganic crystals less than 10 nm in diameter whose tunable size impacts the bandgap, and thus the energy of light capable of being absorbed. When affixed to a transparent semiconductor surface, QDs allow the cell to absorb solar irradiation, triggering the production of a photovoltaic current. However, excitation of the QD leaves a positively charged “hole” in the QD itself, which needs to be replenished to enable current production. In QDSSCs, solubilized redox shuttles are employed to transport electrons from the cathode to the oxidized QDs. However, commonly used redox shuttles, such as the sulfide/polysulfide couple (S²⁻/S_n²⁻), have complex redox chemistry and energetic mismatches with QDs, kinetically limiting the solar cell’s efficiency. Nitroxide radicals, such as 2,2,6,6-tetramethyl-1-piperidinyloxy (TEMPO), have shown utility in dye-sensitized solar cells as stable, electronically active redox shuttles with simple redox chemistry, but have not been explored in QDSSCs. This project compares QDSSCs fashioned from CdSe QDs linked to titanium dioxide through either 3-mercaptopropionic acid or thiosulfate ligands. The redox shuttles were varied between TEMPO, 4-amino-TEMPO, and 4-carboxy-TEMPO. The short-circuit current density, open-circuit photovoltage, and internal power conversion efficiency of each cell were measured and will be reported.

EVALUATING COMPUTATIONAL METHODS FOR ACCURACY IN PREDICTING ORGANIC REDOX POTENTIALS
Tiffany Rivera (California State University Monterey Bay)
Category & Time: Physical and Mathematical Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 371
Mentor(s): Dylan Hardwick (Chemistry), Benjamin Levine (Chemistry)

Due to an ongoing pursuit to replace fossil fuels with renewable energy sources, there is a high demand for large scale electrical grid storage. Computational chemistry methods can be used to predict redox potentials of benzoquinones and hydroquinones; the potentials of which can be tailored by the addition of electron withdrawing groups and electron donating groups. Quinones are an attractive organic material for aqueous flow batteries because they are low cost and undergo a reversible two-electron, two-proton redox reaction. Therefore,

these organic species can be stored as chemical energy in outside tanks, and pumped into a regenerative fuel cell to undergo oxidation and reduction when electric power is needed. This presentation will report geometry optimizations using different theories, functionals and data basis sets to determine the best fit of parameters to predict redox potentials. Accuracy is determined by comparing calculated potentials to experimental potentials. Quantum chemical calculations were performed using the WebMO interface and the Molpro software package. Quantum chemical methods can thus aid electrochemists in the effort to make an all organic aqueous flow battery, provided accurate redox potentials are ensured by calculations.

DETERMINATION OF UNKNOWN COMPOUNDS PRODUCED BY SHOCK EXPERIMENTS
Jami Robbins (Albion College)
Category & Time: Physical and Mathematical Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 372
Mentor(s): Vanessa McCaffrey (Chemistry)

This research is concerned with identifying compounds produced in shock experiments meant to simulate meteoric strikes. The shock experiments were conducted on mixtures of glycolaldehyde (GLA) and/or dihydroxyacetone (DHA) over different clay beds. Analyzation of experimental samples is done by GC/MS after silylation of the samples. Proposed products are also silylated and run through GC/MS. This creates reference spectra that can be compared to experimental spectra to confirm the presence or absence of proposed products. So far this summer, focus has been placed mostly on shock experiments involving a GLA/F.clay mixture (20:1 clay to sugar ratio). The mixture was shocked at three different pressures: 5, 12, and 19 GPa. Over the course of the summer, some reference spectra have been compared to experimental spectra, while some reference spectra have yet to be made. These reference spectra will also be compared to older experimental spectra from shock experiments involving GLA/C.clay and GLA/DHA/C.clay.

ALGORITHM TO IDENTIFY NEURONS IN OPTICAL FLUORESCENCE IMAGING
Desiree Rodriguez (St Marys University)
Category & Time: Physical and Mathematical Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 373
Mentor(s): Mark Reimers (Neuroscience)

New optical imaging technologies, using calcium fluorescence to detect neural activity, have the potential to revolutionize neuroscience, but are hindered by inaccurate automated cell identification. We aim to improve cell identification by finding where the bulk of the errors in current algorithms occur. We are comparing results from current automated cell-sorting methods to careful human annotation of firing neurons (cells) in videos of mouse brains and identifying features that confuse the automated methods, such as overlapping cells. We have developed statistical programs that allows us to go through a lab's data set pixel by pixel and show the disparity between how we've classified ROIs and how the algorithm classified them. This has helped us to visualize where the errors may have occurred. We have worked with many single variable and multivariable statistics, such as covariance, skew, standard deviation, etc., which showed overlapping in data. Bayesian density estimation has helped in measuring our separability in comparison to the algorithms' separability while using the variables. We are now starting to look for a common statistic that all real neurons share. The idea is to find a statistical characterization of pixels belonging to real neurons. With this idea we've begun to look at the consistency of background and firing fluctuations in neurons. We anticipate improving the current algorithm for locating ROI's or finding a better one and will attempt to incorporate any inconsistencies in the estimation of the background of the tiff video files.

EFFECTS OF METHOTREXATE ON LIPID MONOLAYERS
Stephanie Schiffert (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 374
Mentor(s): Krystyna Kijewska (Chemistry)

The goal of this project is to expand the foundation of knowledge about the interactions between anticancer drugs and nanoparticles, the latter used as drug carriers in targeted anti-cancer therapy, and lipid membranes. A Langmuir Blodgett technique was used to obtain monolayers with different composition. Monolayers with the following composition were prepared: 99% DOPC (1,2-Dioleoyl-sn-Glycero-3-Phosphocholine) and 1% DOPERh (1,2-dioleoyl-sn-glycero-3-phosphoethanolamine-N-(lissamine rhodamine B sulfonyl) (ammonium salt)); 89% DOPC, 10% DPPC (,2-dipalmitoyl-sn-glycero-3-phosphocholine), and 1% DOPERh; 89% DOPC, 10% cholesterol, and 1% DOPERh. The monolayers were created at the water-air interface. We used water, an aqueous solution of methotrexate (an anti-cancer drug) and an aqueous suspension of magnetic nanoparticles modified with methotrexate as a subphases. The changes in organization of preparation-forming monolayers were studied using Brewster Angle Microscopy (BAM) and recorded pressure-area (Π-A) isotherms. Shifts in respective isotherms indicate an interaction between the drug and its conjugate with the monolayer. The formed monolayers were further studied with Fluorescence Recovery After Photobleaching (FRAP). Lateral diffusion of membrane constituents plays an important role in membrane organization. The FRAP technique provides information on interfacial dynamic properties and the spatial distribution of membrane constituents. We used lipids labeled with rhodamine as a fluorescent probe molecule to study dynamic properties of prepared monolayers. Our data demonstrate a measurable interaction between Methotrexate and the lipid monolayer.

UNDERSTANDING AND CHARACTERIZING STUDENT REASONING ABOUT THE INTERDISCIPLINARY PHENOMENON OF SNEEZING
Alec Shrode (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 377
Mentor(s): Vashti Sawtelle (Physics & Astronomy)

Many of the problems that will face our next generation of scientists will require solutions that span scientific fields to successfully address their impacts. However, it is unclear if university students are being adequately prepared to wrestle with these complex interdisciplinary problems by their discipline-specific science courses. We evaluated the ways that undergraduate science students leveraged knowledge from introductory chemistry, biology, and physics courses, when crafting explanations about the interdisciplinary phenomena of sneezing. We did this by analyzing student explanations of the expansion of the "cloud" released during a sneeze. Data was collected using an online survey given to students in disciplinary courses from both Michigan State University and Florida International University, which was then coded using two dimensions - the Structural Scale of Reasoning and the Scientific Model. In this poster we will show how students crafted these explanations from i) a colloquial frame, where students used personal experience to explain the phenomena in everyday language; ii) a partial scientific frame, where students attempted to use scientific ideas in their explanations, often mixing colloquial and scientific language; and iii) a scientific frame, where students accurately drew upon scientific ideas and language to express their ideas.

COMPUTING SOLUTIONS OF THE SCHRODINGER EQUATION FOR COUPLED CHANNELS NUCLEAR SCATTERING PROBLEMS WITH NON-LOCAL POTENTIALS USING THE R-MATRIX METHOD
Benjamin Slimmer (Clemson University)
Category & Time: Physical and Mathematical Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 378
Mentor(s): Filomena Nunes (National Superconducting Cyclotron Lab)

The calculable R-matrix method has been shown to be an efficient method for describing scattering states from nuclear interactions. The method has been applied with success to calculate solutions to the Schrodinger equation in two body, single channel scattering reactions. The purpose of this study is to extend the R-matrix method to calculate solutions to a non-local, coupled channels reaction. Such a method will calculate wavefunctions using the local and non-local interactions within each channel, and also include coupling potentials between the channels. We use the Woods-Saxon and Perey Buck potential models for the local and non-local potentials. The Lagrange-mesh method is chosen to compute solutions to the scattering problem. The R-matrix method can be successfully applied to solve for the wavefunction of the projectile in each channel, although calculation of the solution is more computationally intensive than a single channel reaction. The R-matrix method is an effective approach to calculating solutions for coupled channel reactions. While this study focused on a two coupled channels case, in theory the method could be applied to more channels, at the cost of more computation time with each additional channel.

A PYTHON TOOL TO COMPARE NEUTRON STAR STRUCTURE AND OBSERVATIONS
Joseph Slivka (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 379
Mentor(s): Edward Brown (Physics & Astronomy)

Neutron stars are formed when the core of a massive star collapses at the end of its main cycle. They are extremely compact objects, with comparable masses to the sun but packed within the size of a large city. As a result, neutron stars are a natural laboratory for studying matter at densities above that of atomic nuclei. Many theoretical nuclear equations of state have been developed attempting to describe the interiors of neutron stars and further understanding on the behavior of matter at these high densities. Using an equation of state (a relation of pressure to density within the star) and comparing to observations, astronomers can compute the mass and radius of a neutron star and constrain the properties of dense matter. In this project, I create a python package that evaluates a user-defined equation of state to find a corresponding mass and radius of the neutron star. This information can be compared with observations to test the validity of the given theoretical equation of state.

POTENTIAL SOLUTION TO THE FOKKER-PLANCK EQUATION IN THREE DIMENSIONS
Dylan Smith (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 380
Mentor(s): Christoph Adami (Microbiology & Molecular Genetics)

Evolutionary Game Theory (EGT) is used to model individual strategies with regards to ecological populations, and mapping the trends of winning and losing strategies over time. The chief method of showing two individuals given a choice of n strategies is via a payoff matrix with (n+1)x(n+1) dimensions, and this dynamic is given by the replicator equation. Games with three strategies are more complex, and thus, more complex equations are needed. The primary equation to model probabilistic games in higher dimensions is the Fokker-Planck Equation (FPE), a stochastic partial differential equation used to measure the evolution of a frequency distribution under drift and diffusion forces. Despite its usefulness in incorporating random evolutionary effects, the FPE becomes increasingly difficult to solve in higher dimensions (in other words, with more possible strategies). A solution to the FPE has been found in two dimensions; however, no solution has been found in three dimensions. A stationary solution (or a solution of the FPE in which the equation equals zero) has been found in the form of a potential path integral. Solving the path integral for the full solution involves incorporating a set of mandatory conditions, mainly that it follows detailed balance, or that the integral is path-independent. This stipulates that the potential is divergence-free and that the

probability current that comes from the potential is divergence-free. With a solution to the FPE, it will make mapping out three-strategy games much more feasible.

SECAR: THE SEPARATOR FOR CAPTURE REACTIONS IN NUCLEAR ASTROPHYSICS
Aalayah Spencer (Michigan State University)
Category & Time: Physical and Mathematical Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 381
Mentor(s): Sara Ayoub (National Superconducting Cyclotron Lab), Hendrik Schatz (National Superconducting Cyclotron Lab)

Recoil separators are used to directly measure the reaction rates of proton and alpha capture reactions that take place in stellar explosions (e.g., X-Ray Bursts, Novae, etc.). SECAR is a newly designed recoil separator at the National Superconducting Laboratory (NSCL) and eventually the Facility for Rare Isotope Beams (FRIB) supported by DOE Office of Science Office of Nuclear Physics and the National Science Foundation. It is designed to achieve the highest particle rejection rate yet, estimated at 10¹⁷ particles per beam, needed to mainly measure the rates relevant to novae and x-ray burst phenomena. As of now 20 out of the 24 magnets that make up SECAR have been delivered, tested, and accepted for commissioning with the following magnets to be delivered in November 2017 and the first velocity filter delivery in January 2018. This paper will discuss the motivation for SECAR, the process in which the separator is being implemented at the facilities, the methods used to ensure that the magnets that make up SECAR will be able to perform at the desired specifications, including testing for magnetic field reproducibility and discuss how the eventual commissioning of the magnets will occur.

NICKEL ADAMANTANEDICARBOXYLATE AND ADAMANTANEDIACETATE COORDINATION POLYMERS WITH DIPYRIDYL LIGANDS
Jamelah Travis (Hope College)
Category & Time: Physical and Mathematical Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 382
Mentor(s): Robert LaDuca (Chemistry)

Coordination polymers are crystalline solids with metal atoms linked together by organic ligands. Hydrothermal reaction of nickel nitrate, an adamantane-based dicarboxylic acid, and a hydrogen-bonding capable dipyridyl ligand generated four coordination polymers which were structurally characterized by single-crystal X-ray diffraction. The compounds prepared possessed layered networks and rare 3D net topologies. In addition, magnetic properties of two compounds containing embedded dimeric units were investigated, resulting in antiferromagnetic coupling.

SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES

EXPLORING HOUSING BARRIERS FOR DOMESTIC VIOLENCE SURVIVORS WHO IDENTIFY AS DISABLED
Lydia Abraham (Beloit College)
Category & Time: Social, Behavioral, and Economic Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 385
Mentor(s): Cris Sullivan (Psychology)

Domestic violence (DV) is often accompanied by homelessness. DV survivors may experience sexual trauma, physical abuse, or economic abuse, which includes having wages withheld, loans being taken out in their name, or being restricted from working. These experiences put survivors at risk of poverty, housing instability, and homelessness when leaving their abusive partner. A DV survivor who leaves their abuser is at risk for homelessness immediately, with 38% becoming homeless then and an additional 25% becoming homeless within the first year. A survivor may seek help at resources including an emergency homeless shelter or domestic violence shelter. When a survivor reaches out for help, both their safety and housing needs should be addressed. There is currently little information on the variety of housing barriers that DV survivors face when trying to secure housing. These experiences can be different when a person self-identifies as having a disability, as having a disability impacts the form and length of abuse. This study will address the gap in the literature by interviewing DV survivors about their housing challenges. Major housing barriers were found and there was a difference in DV survivors' ability status with housing barriers, social support, and experience of economic abuse. Semi-structured interviews of DV survivors in a transitional housing facility were analyzed using SPSS.

INVESTIGATING THE ROOTS OF AFFECTIVE PARTISAN POLARIZATION IN GHANA
Arhin Acheampong (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 386
Mentor(s): Jeffrey Conroy-Krutz (Psychology)

The rise in partisan polarization in the United States—with voters increasingly loyal to their favored party and increasingly distrustful of the other—has garnered significant attention, but the US is not the only country experiencing this phenomenon. Surveys and political discourse suggest a sharp rise in affective partisan polarization in Ghana, which has a strong two-party system, as well. Using data from seven nationally representative surveys conducted by the Afrobarometer between 2002 and 2016, this project explores factors associated with "strong partisanship" (i.e., being a strong supporter of one party and a strong opponent of the other) in Ghana. Specifically, we examine how ethnic and religious identities, education, wealth levels, age, and gender are associated with partisanship. We also estimate the effects of exposure to radio—the most widely accessed mass medium in Ghana—on affective partisan polarization. Many have blamed radio

stations, many of which have obvious political biases and frequently broadcast charged rhetoric, for the rise in polarization, but experimental evidence has found little support for this conventional wisdom. We use Irregular Terrain Models, which consider stations' technical characteristics and local topography, to map signal propagation for every radio station in Ghana, and then use georeferenced survey data to estimate the causal relationship between signal availability and partisan attitudes. Our findings will mark an important contribution to the study of a phenomenon that, if it continues unabated, might result in the degradation of one of Africa's best-developed democracies.

DOES TRAINING IMPACT POLICE OFFICERS' RACE BIAS IN THEIR DECISIONS TO SHOOT?
Brianna Benjamin (University of Virginia)
Category & Time: Social, Behavioral, and Economic Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 387
Mentor(s): Joseph Cesario (Psychology)

There is widespread concern about officers' propensity to shoot unarmed blacks relative to unarmed whites. Over the past decade, laboratory studies have confirmed that participants are more likely to shoot unarmed blacks in computerized tasks. However, previous work has overwhelmingly used untrained undergraduates in these studies, and have also neglected to fully address the effect that training has on police officer recruits' decisions to shoot. This novel research will test the effect of training on recruits' decisions to shoot, and the degree of race bias in those decisions. Police recruits in a large midwestern department were tested for race bias in a shooting simulator both before and after their firearms training. In the shooting simulator, officers hold a modified handgun, and react to videos that show either black or white people quickly pulling objects from behind their backs. Officers are instructed to shoot only if the person in the video has a gun. The simulator records whether the officer fired, and how quickly they did so. It is used to quantify whether officers are more likely to mistakenly shoot an unarmed black relative to an unarmed white civilian. We expect to see greater accuracy and faster reaction times when recruits are tested after they have been trained versus before training. Additionally, we expect to see a decrease in race bias after training.

THE TEMPORAL CONTIGUITY EFFECT IS MODULATED, BUT NOT ELIMINATED, BY ORTHOGRAPHIC DISTINCTIVENESS
Lauren Bernhardt (Michigan State University), Riley Smith (Michigan State University), Jacob Zerka (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 388
Mentor(s): M Karl Healey (Psychology), Mitchell Uitvlugt (Psychology)

Remembering one event often triggers recall for other events encoded nearby in time to the initial event. This temporal contiguity effect has been demonstrated in studies where participants learn lists of words that are not inherently memorable and follow no logical sequence. In such scenarios, the memory system may be forced to rely on the temporal distance between words to facilitate recall. A recent study found that the contiguity effect is eliminated when orthographically distinct words – unusually spelled words (e.g., svelte) – are memorized. This finding challenges existing computational models which predict that the temporal contiguity effect should be unaffected. Because of the theoretical implications, we sought to replicate this study with a larger sample size, providing more precise measures. Three lists of ten words were presented to 338 participants to memorize and recall in any order. Participants were divided into two conditions: the distinctiveness group memorized lists of orthographically distinct words, and the control group memorized orthographically common words. Unlike the original study, we found that the temporal contiguity effect was present regardless of word type; both groups recalled the words in an order resembling the originally-memorized list. However, the contiguity effect was smaller in the distinctiveness group than in the control group. These results show that although distinctiveness does not eliminate contiguity altogether, it does modulate the magnitude of the effect. Existing models should be expanded to include mechanisms that better accommodate distinctiveness.

THE CUISINE OF THE FINAL FRONTIER: ALASKAN RED KING CRAB AND TOURISIMIZATION
Sam Bloch (Michigan State University), Wnuk Nina (Michigan State University), Marshall Ross (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 389
Mentor(s): Helen Veit (History)

Specifically in the 1960s, after Alaska's induction as a state, the fishermen and natives of Alaska wanted to offer some of their culture that could be integrated into American society. Following Alaska statehood, a base was established at Juneau, Alaska, in 1960 and the responsibilities of commercial fisheries were transferred from Seattle. However, since the Alaskan red king crab was such a prominent industry before the induction of Alaska to America, it's hard to say exactly that crab was a new food to the American people. Instead, it is the way of preparation and dish combination that made it's way from Alaska to America at this time. This particular research investigates how the preparation of crab originated in Alaska and how it became Americanized in terms of mainland alterations. From boiling crab in beer and blending with seal meat, to boiling in water and lemon juice, these findings lend insight into how food was essential in forming a relationship with the final frontier. They also provide a unique perspective of the culinary and cultural tourismization of Alaska. Food, in this particular case, the Alaskan Red King Crab, can be salient in revealing certain societal trends and changes.

AN ANALYSIS OF ONLINE COMMUNITY NEWCOMER'S MENTAL MODELS OF PERCEIVED CREDIBILITY
Dorothy Blyth (The University of North Carolina at Chapel Hill)
Category & Time: Social, Behavioral, and Economic Sciences, Section 1, 1:00 PM - 2:15 PM
Poster: 390
Mentor(s): Shaheen Kanthawala (Media and Information), Rick Wash (Media and Information)

As online communities become increasingly integrated into our daily lives, individuals are at a greater risk than ever of being manipulated and/or misinformed. Particularly, online health communities, which are targeted toward a vulnerable audience, are susceptible to incorrect or misleading information due to the fact that any member is able to create and post content on the site and website administrators are tasked with maintaining credibility while avoiding excessive censorship. In this study, we examine the factors of a website that establish mental models for newcomers, through measuring perceived credibility of an online community. One group experienced a site with web-administered verified badges, the second group with community-ranked points, and the third group was a control with no external credibility indication. Each participant filled out an online survey. Then, we quantitatively analyzed the collected data. Through our analysis, we expect to find that newcomer's perceptions of online communities are influenced by site features and we expect that members with a verified badge have a higher perceived credibility than those without one and we expect to find that users will have an increase in motivation to post quality content if there is a verified badge feature on the site. Additionally, we expect to find that the community as a whole has a higher perceived credibility if a badge it associated with it. Thus, having this higher perceived credibility on an online may reduce the need for website administrators and can therefore lower financial costs of running an online community.

NAFTA AND THE IMPORTS AND EXPORTS OF GRAPE JUICE
Taylor Chavis (Hampton University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 1, 1:00 PM – 2:15 PM
Poster: 391
Mentor(s): Steve Matusz (Economics)

This poster examines the impact of NAFTA on the trade of grape juice from Mexico to the United States. We analyzed the major imports and exports between Mexico and the United States. We collected data from FAO.org covering the years before NAFTA through 2013. We plan to analyze the data using different models, including multiple regressions. This project outlines how free trade has helped Mexico and the United States economically. The project is limited to grape juice to allow an analysis of a processed agricultural product.

QUALITATIVE ANALYSIS OF UNDERGRADUATE STUDENTS' WRITING OF THE ORIGIN OF GENETIC VARIATION
Hailey Cockerill (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 393
Mentor(s): Andrea Bierema (Lyman Briggs), John Merrill (Microbiology & Molecular Genetics), Mark Urban-Lurain (CREATE for STEM)

Genetic variation is an important core concept for undergraduate biology education outlined in Vision and Change. How new genetic variants originate in a population is usually challenging for students to understand because of the common misconception that mutations are harmful. The Automated Analysis of Constructed Response research group (AACR) develops computer-automated tools to analyze students' writing by creating scoring models that predict human scoring via a combination of computer trained scoring and statistical analyses. Our research group develops assessment prompt revealing student thinking about "big ideas" in undergraduate STEM Courses. To reveal student thinking on this topic, AACR uses constructed response (CR) assessments, in which students write short answers using their own words. To understand student thinking about the origin of a new variant (trait) in a population, we developed a CR question about how an isolated population of buffaloes began to exhibit a new hair color and how a rapid increase in a new hair color occurred. An exploratory analysis of responses (n=401) revealed main themes and several incorrect themes that proved the question and prompt needed revision. Many students restated phrases and/or words directly from the prompt to explain their thinking which lead to a prompt revision. Analysis of new responses (n=100+) lead to a development of a new analytic rubric. The resulting AACR question can be used by instructors to understand their students' thinking and to align their instruction with a core concept of Vision and Change.

DOES MUSICAL TRAINING ENHANCE SPEECH UNDERSTANDING IN NOISE?
Audrey Drotos (Lyman Briggs College), Sarah Dec (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 394
Mentor(s): Lauren Amick (Psychology), J Devin McAuley (Psychology)

Previous research suggests that music training may enhance the ability to understand speech-in-noise (SIN). Parbery-Clark, Skoe, & Kraus (2009) found that highly-trained musicians performed better than non-musicians on SIN tasks. Slater & Kraus (2015) also found that percussionists performed better than non-musicians on SIN tasks. However, limitations to previous work include small sample sizes, limited assessment of SIN ability, and reliance on group comparisons. Two experiments were conducted that investigated individual differences in SIN ability. In Experiment 1, 173 participants completed a test battery that included a wide range of SIN measures, as well as assessments of hearing acuity, basic auditory capabilities, rhythmic ability, cognitive ability, and music training/experience. In contrast to previous work, neither years of music training or self-rated music ability reliably predicted SIN ability. Factors that did predict SIN ability included verbal and non-verbal IQ ($r = 0.25$, $p < 0.005$), familiar sound recognition ($r = 0.27$, $p < 0.01$), and amplitude modulation discrimination ($r = 0.23$, $p < 0.01$). One reason for a lack of musician-advantage in speech understanding in noise could be that musicians represent a high-risk group for excessive noise exposure and may exhibit hidden hearing loss; this could counteract any advantage conferred by musical training. Experiment 2, which is ongoing, directly compares highly-trained musicians' and non-musicians' SIN ability and individual noise exposure to determine whether controlling for noise exposure reveals a musician advantage in SIN perception, as was found in previous work.

PERU AND THE PATRIARCHY: HOW MACHISMO IS DETRIMENTAL TO MENTAL HEALTH IN THE NORTHERN ANDES
Katie Edwards (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 395
Mentor(s): Rene Rosenbaum (Planning, Design, and Construction)

The purpose of the study is to uncover how the the known problem of "machismo", or the patriarchy, in the northern Andes of Peru, affects the mental health of the women who live there. The Leoncio Prado Hospital Psychology staff and I interviewed 48 women of different ages and communities, which allowed us to gain perspective on the reality the mental health of these women. We found that machismo is much more prevalent in the countryside vs. a city or urban area. Based on our correlational data, the higher the prevalence of machismo was, the earlier the age of marriage was, the lower the education and literacy rates were, and the poorer the communication and social abilities were in women. All of which (by Peruvian definition) impact one's mental health, in this case negatively.

HOW DEMOCRATS AND REPUBLICANS COMPARE TO EACH OTHER IN POLITICAL STATEMENTS
Sean Frobel (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 397
Mentor(s): Allison Eden (Communication), Lindsay Hahn (Communication)

Researchers have been studying moral concerns for some time now. Recent investigations have begun to examine how different aspects can lead people to hold some moral dimensions to a higher degree than others (e.g., moral foundations theory; Haidt & Joseph, 2007). Past researchers have tried to accomplish this by applying moral word count programs to participants' statements to understand the difference between moral concerns in self-proclaimed republicans and democrats (Koleva, Graham, Iyer, Ditto, & Haidt, 2012). What they found was that democrats' speech tended to focus more on care and fairness words when compared to republicans who had a more balanced focus on the five moral foundations' words. What we wanted to do was compare findings of word count programs to actual human interpretation of these statements to potentially catch the nuance of human morality that could be missed with simple word count programs. To do this we trained coders for seven weeks by teaching them about moral foundations theory by recognizing them in examples and then discussing findings in meetings. Coders then examined statements by 264 participants asked to give their opinion of politicians on different topics (e.g., environment, military, economy, etc.). Our results suggest that moral attributes in the words between democrats and republicans do not differ much at all in their moral foundations, but that instead moral differences depend on the topic that is being asked about. Our results will further focus on the differences between human coding and the word count program.

PUTTING THOUGHTS INTO WORDS: AN ANALYSIS OF HOW USERS THINK ABOUT ONLINE COMMUNITIES
Julie Gerstley (Tulane University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 398
Mentor(s): Rick Wash (Media and Information)

Online communities provide the opportunity for diverse groups of people to share ideas, emotions, information, and more. Participation in this type of community is voluntary; therefore site creators must regularly adapt to the fluctuating needs of their groups. To make adequate adjustments in online communities, we first need to develop a greater understanding of how individuals form and change the mental models that influence participation. To examine users' mental models of online communities we qualitatively analyze user experiences. Long-term, active members of online communities participate in semi-structured interviews about the interactions that they have had with their community. We will carry out analysis using open coding of transcripts that will lead to the identification of major themes regarding user mental models and how they have changed. These themes will help us uncover the underlying thought processes that shape users' models of their communities. For example, pilot interviews have shown a pattern between external life changes (i.e. travel) and deviations in how often a user frequents their community. Administrators and users alike will benefit from improved design, management, and participation of online communities. When users are asked to submit critiques or suggestions, they often do not have a clear way of stating what they want. By learning how to interpret the thought patterns of individuals in online communities, researchers will be able to address persistent problems in a more permanent way. Moreover, the data collected will contribute to education in the information, cognitive, and social sciences.

POTENTIAL PREVENTATIVE EFFECTS OF OUT-OF-SCHOOL TIME PROGRAMS
Sandra Gomez (Cornell College)
Category & Time: Social, Behavioral, and Economic Sciences, Section 2, 1:00 PM - 2:15 PM
Poster: 399
Mentor(s): Ignacio D Acevedo-Polakovich (Psychology), Sara Stacy (Psychology)

Students who are at risk of school failure and or dropping out likely through significant obstacles that prevent them from reaching their full potential, marking them at risk. Particularly, students living in poor communities are at a greater risk than other social economic classes. After school or Out of School Time (OST) programs are implemented to alleviate disparities. OST programs have been shown to increase positive development, increase initiative, and better school achievement. The OST scholars program in Michigan implemented in a public housing sector was evaluated by Youth Go; a participatory research approach directly involving the youth. Youth GO is a five step process where the Scholars provide their perspectives on different prompts, involving education, the scholars program, and organize the information. Youth GO was implemented because previous literature demonstrates partnering with youth to gain perspectives on programs provides unique insight and empowers youth. The Scholars program mission is to increase graduation and acceptance into a college or university. It was hypothesized the Scholars program was meeting the needs of the students in order for them to receive benefits of OST

programs and on the path to college acceptance. Motivation to influence school and community, perceived control, policy control, critical social reflection and attitudes toward school will be analyzed using pre and post survey to understand if the Scholars Program is effective. In addition to those variables, responses to the prompts provided will be analyzed.

WORK-LIFE BALANCE IN ACADEMIA
Antonio Trey Gonzalez III (St Mary's University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 402
Mentor(s): Terah Venzant Chambers (Educational Administration)

Previous research has show that due academicians having higher than average stress levels, they have a low levels of job satisfaction, organizational commitment, and work-family enrichment. Given that these are all good predictors of work life balance, our study seeks to understand that work-life balance within academicians; With our proposed hypothesis stating that Work-Life Balance differs for Non-tenured and tenured professors. a qualitative approach utilized for this project. Individual interviews were conducted upon 6 professors from Michigan State University. Each individual interview response was transcribed and coded into the prospective categories. Final analysis were then ran on the dataset via SPSS. The limitations of the study included its sample size and time constraints. Increasing the sample and thus having more time to conduct the study would allow for more accurate findings.

CAN NONPROFITS PROMOTE RECOVERY IN DETROIT AND FLINT?
Gerson Guevara (Jackson State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 403
Mentor(s): Sarah Reckhow (Political Science)

The growing role of nonprofit community based organizations in urban areas poses significant questions to the future of government and nonprofit collaboration. Nonprofits in recent times have been playing dynamic roles in local government. This paper analyzes the role of nonprofits in the ongoing recovery of both Flint and Detroit, from the Flint Water Crisis and Detroit Bankruptcy, respectively, and asks the question: Can nonprofits promote recovery in Detroit and Flint? We expect to collect data that demonstrates growth within the nonprofits themselves, which is a good indicator of government health. Over the course of a couple months various nonprofit directors responded to a survey that asked a variety of questions regarding funding, investment, levels of trust, and collaboration. In addition we have collected data on the endowments these nonprofits have received. In order to analyze our results we will perform simple linear regression as well as an analysis of variance between Flint and Detroit. Within our findings we expect to find an array of data that sheds light on various important issues that are the vital to the recovery of both cities, including: the trust between governments, citizens, and nonprofits, the amounts of money invested into these cities, the longevity of these nonprofits within the cities, and the partnerships these nonprofits formed. The challenges faced by Flint and Detroit are not unique to them, if the presence of nonprofits promotes growth and recovery in these cities, then it would be prudent for other cities to adopt similar strategies.

GENDERED THEMES IN COLLABORATIVE CRIMINAL JUSTICE PUBLICATIONS
Sean Hancock (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 404
Mentor(s): Sanja Kutnjak Ivkovic (Criminal Justice)

Journal publications are cited as being most critical to professorial promotion. With an increased percentage of collaborative journal publications (62.8%), it is important to examine trends in co-authorship. The purpose of this study was to analyze gender inequity trends in co-authored Criminal Justice journal publications that may place women at a disadvantage for receiving tenure. Curriculum Vitae from tenure-stream faculty of MSU School of Criminal Justice, one of the top 28 Ph.D.-granting Criminal Justice Programs in the nation, were analyzed using SPSS. From the sample of tenure-stream faculty (n=24), we analyzed trends in collaborative journal publications. Data were represented in tables, showcasing publication trends in male-male, male-female, and female-female co-authorship. To obtain an average number of scholarly articles published per year, we counted all journal articles published divided by the number of years since the Ph.D. has been awarded. We also counted all journal articles published divided by the number of years since the year of the first publication to avoid disadvantaging senior faculty. Analysis revealed apparent gender stratification within collaborative publications. Both men and women were more likely to publish with other men, resulting in an overrepresentation of men in Criminal Justice journal publications. Gender inequity in co-authorship may contribute to the underrepresentation of tenure-stream female Criminal Justice faculty at MSU. To further examine this phenomenon, similar studies should be conducted within the nation's remaining 27 Ph.D.-granting Criminal Justice Programs.

WOMEN AND MINORITIES FALLING OFF THE GLASS CLIFF
Taniyia Harvey (University of Maryland – College Park)
Category & Time: Social, Behavioral, and Economic Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 405
Mentor(s): Ann Marie Ryan (Psychology)

Women are only 5.2% of the total CEO's in 2015 even though women are 50.8% of the US population (Hurley & Choudhary, 2016). In addition, only 19 Fortune 500 CEO's are people of color (Cook & Glass, 2014). Women and minorities in the US face unwarranted challenges in the workforce because of their gender and race. The glass cliff phenomenon occurs because the board members and directors have placed women and minorities in leadership positions in companies that face organizational crises or declines. Prior research on the glass cliff has primarily focused on White women, in this paper race will also be a variable. In this experiment 500 participants reviewed a

marketing firm's job advertisement for a manager, a newspaper article on the company's performance, a LinkedIn profile on a potential hiring candidate, and an endorser's thoughts on the candidate's work ethic. The participants then answered several follow up questions on the candidate's fit with the company. Then the data was analyzed using multivariate and univariate analyses. Race and gender did not have overall effects or interactions. Furthermore, there were significant overall multivariate findings were for trait and company performance. There were significant effects of trait on qualifications, trait on salary, company performance on emotional reaction, and company performance on salary. Some of the major findings were opposite of the glass cliff phenomenon because minority candidates and White women's ratings and salaries were "boosted" which may mean people were trying to cover their biases.

UNDERSTANDING THE OPPORTUNITY GAP FOR BLACK MALES IN K-12 EDUCATION
Tim Herd (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 406
Mentor(s): Chezare Warren (Teacher Education)

This research examines teacher beliefs and the adverse effect they may have on young Black male's academic success. We attempt to answer the question "What do practicing K-12 classroom teachers believe about empathy and other issues of diversity for improving the academic success of young Black men and boys"? This examination of certain teacher beliefs helps better understand the persistence of opportunity gaps. Opportunity gaps derive from school factors that play a negative role in placing children at disadvantage based on reasons which may include race, socioeconomic status, and gender. This study uses a revised survey intended to measure teacher conceptions of empathy and other issues of diversity (S-TEAAM, Warren, 2015). This study also aims to deepen our understanding of the ways teacher beliefs influence their professional decision making. We define "issues of diversity" based on the five dimensions of H. Rich Milner's (2012) "explanatory framework of opportunity gaps": color blindness, low expectations & deficit mindsets, context-neutral mindsets, cultural conflicts, and the myth of meritocracy. We also plan to conduct at least five follow-up interviews with teachers who complete the survey to further uncover their feelings of empathy with young Black males and the ways their beliefs about diversity drive their professional decision making. Another goal of the research is to pretest a survey instrument as part of a larger effort to build validity sufficiently measuring teacher's empathy with Black male students and their general beliefs about other issues of diversity impacting their teaching effectiveness with this population.

PARENT'S SELF-EFFICACY EFFECT ON CHILD'S SOCIAL COMMUNICATION SKILLS AND IT'S MEDIATION THROUGH PARENT FIDELITY
Rachel Johnson (Prairie View A&M University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 407
Mentor(s): Brooke Ingersoll (Psychology)

Early intervention for autism spectrum disorder (ASD) is important for improving child and family outcomes (Siller, Hutman & Sigman, 2013). Specifically, parent-mediated interventions (PMI) are considered best practice for early treatment of ASD (Casagrande & Ingersoll). Parent-mediated intervention has been shown to improve parent self-efficacy and child social communication outcomes, as well as reduce parental stress (Hastings & Symes, 2002). Self-efficacy usually is seen as result of the intervention (Keen, Couzens,Muspratt & Rodgers). However, it is unknown whether parent characteristics, such as self-efficacy, relate to parents' ability to learn and perform new intervention skills. Similarly, it is unclear if parent self-efficacy is related to child outcomes through the mechanism of improving parents' intervention skills. This study investigates how parent self-efficacy relates to improvement in child social communication skills in a parent-mediated intervention. In addition, we explore whether the relationship between parent self-efficacy and child change is mediated by parent treatment fidelity, or adherence to the treatment protocol. We expect that parents who feel more self-efficacious will perform the intervention at higher fidelity, and have children who show more gains in intervention. Understanding the role of parent self-efficacy in successfully engaging in parent-mediated intervention may help researchers and clinicians tailor treatments based on family needs.

IT'S ONLY KIDS PLAY AS I GROW: HOW PARENTS' ROLES ARE INFLUENCED BY CHILDS' PLAY OVER TIME
Caroline Kane (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 3, 1:00 PM - 2:15 PM
Poster: 408
Mentor(s): Claire Vallotton (Human Development & Family Studies)

Parents' involvement in child's play predicts their language, cognitive, and social development (Nokali, Bachman, & Votruba-Drzal, 2011).The relationship between mother and child changes through toddlerhood. So as an infant develops, they take on more of an active role during play by choosing and directing their own play. This allows and influences the role a mother takes during play (e.g., Fein & Fryer, 1995). For example, parents become less directive, but continue their involvement on the sidelines (Haight & Miller, 1993).This study has a goal of understanding the transition of roles a parent takes during child's play, as the toddler develops. Using observations from 5 minute recorded videos of mother-child interactions across toddlerhood (12, 18, 24, and 30 months of age), this study documents the transition in roles of a mother interacting with her child. I looked specifically at the roles of director, facilitator, manager, co-player, hands off, or disengaged and whether the percent of time in each role significantly changes. Using an ANOVA, I will test the hypothesis that from early to later toddlerhood parents will become less of a manager and more of a co-player in their child's play. Associations between parent's roles and other qualities in their interactions will also be explored. This research may have important implications for parenting interventions such as those treating mothers with postpartum depression.

PREVALENT STUDENT CONCEPTIONS INVOLVING STRUCTURE-FUNCTION RELATIONSHIPS IN CELL MEMBRANES.
John Knapp (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 410
Mentor(s): Kevin Haudek (Education), John Merrill (Education), Kamali Sripathi (Education), Mark Urban-Lurain (Education)

Student understanding of structure-function relationships has been identified by the American Association for the Advancement of Science (AAAS) as a Core Concept due to its ubiquity in biological processes. Many students memorize key words rather than understanding and correctly applying the biological meanings of those words when describing specific processes. Constructed response (CR) questions have been shown to provide a more in-depth picture of student thinking than multiple choice (MC) questions. However, use of CR questions in large-enrollment classes is typically unfeasible due to the time and resources required to score them. The Automated Analysis of Constructed Response (AACR) group uses predictive computer models to provide real-time feedback to faculty about student thinking. We are developing a question that focuses on the structure-function relationships between phospholipids within a cellular membrane. We collected 777 introductory biology student responses from two universities. We used an emergent coding approach to analyze the data and develop a rubric that captures prevalent conceptions in student answers. Core rubric categories include: Unfavorable interactions between hydrophobic/hydrophilic parts of the lipids, discussions of energy, and global membrane structure and function. Several rounds of consensus scoring between three scorers have been completed in order to further develop this rubric. This development includes identifying conceptions and solidifying the rubric, with the ultimate goal of creating a predictive scoring model. The results from our study will provide detailed insight into students' alternative conceptions regarding structure-function relationships in a less-well-studied context, that of the cell membrane.

"WE ARE ALL ASIAN": THE GEOPOLITICS OF RACE AND BEAUTY IN POST-COLONIAL HONG KONG
Jeffrey Le (Beloit College)
Category & Time: Social, Behavioral, and Economic Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 411
Mentor(s): Anna Pegler-Gordon (James Madison College)

In the increasingly interconnected Asia-Pacific, the Hallyu Wave, or the transnational spread of Korean popular cultural products has introduced Korea to the globe as a modern, cosmopolitan place. Enrapturing the region in a haze of infectious music videos, television dramas, and skincare products, Korea has been sold as a pinnacle of bodily beauty. In Hong Kong, a place made famous by its cultural hybridity, this contemporary encounter with Korea is played out in disjunctive mimicry: however fraught, looking 'Korean' is now an aspirational beauty ideal. Drawing on ethnographic work in a series of Hong Kong shopping malls, this study situates beauty practices in Hong Kong as contentious mediations of inter-Asian cultural and technological flows .The use of skincare and makeup allows users to embody shifting and contingent notions of racial "Asianess" which accompanies the region's growing embrace of neoliberal capitalism. In short, the consumption of Korean skincare in Hong Kong serves as a marker of cultural and racial capital, delineating an imagined geography of capitalist-friendly East Asia, and a way in which the 'Asian' body is performed.In interviewing proponents of this trend, I show the tensions which arise between the global, the local, and the regional in global encounters. In this post-colonial landscape of consumption, ethnicity, race, hybridity, cosmopolitanism, and modernity have become tightly entangled in Asia's World City.

PERCEPTIONS OF NURSING DISCIPLINE AMONG DIFFERENT CULTURE GROUPS
Vanessa Lee (University of Detroit Mercy)
Category & Time: Social, Behavioral, and Economic Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 412
Mentor(s): Molly McClelland (College of Health Professions)

The purpose was to determine the perception of nursing discipline, which disciplines are considered a STEM (science, technology, engineering and math) profession and if those perceptions vary by age, culture, gender or previous experience with a STEM professional. Nursing has been included as part of the NIH BUILD grant, yet discrepancies exist about nurses being perceived as research scientists. Currently, fewer than 1% of nurses have a doctoral degree (Feeg et. al., 2011). The nursing profession is said to have long suffered from public stereotyping and from being closely associated with femininity and powerlessness (Takase et al.,2002). A mixed method approach was implemented. Adult participants who self-identified as American, Canadian, Kenyan or from Hong Kong were asked to complete a questionnaire. Survey results were collected and analyzed quantitatively using SurveyMonkey. Interviews were conducted and interpreted using qualitative methods. A Chi-Square statistical analysis revealed no significant difference between how various cultures view health professions as STEM disciplines. Nurses were predominately perceived as being part of the STEM disciplines but not scientific. Nurses were viewed as "less scientific" than perceived chemists. Nurses were viewed as less scientific than other health-related professions. Registered nurses were perceived as more scientific than nursing professors. The discipline of nursing suffers from negative public perception and media coverage suggesting nurses are not intelligent, hand-maid to doctors or sexual playthings. More work is needed worldwide to educate the public on the scientific education and practice of the discipline of nursing.

COPING STYLES AS A MEDIATOR/MODERATOR FOR THE RELATIONSHIP BETWEEN ADAPTABILITY AND SUBJECTIVE WELLBEING IN THE WORKPLACE
Tyleen Lopez (St John's University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 413
Mentor(s): Frederick Leong (Psychology)

Adaptability is the ability for an individual to adjust to change which is imperative for everyday life, especially within the workplace (Mumford et al, 1993). Organizations are constantly changing due to technology, growth, and globalization (Ployhart & Bliese, 2006). As a result, individuals must be comfortable with uncertainty to operate efficiently in a rapidly changing workplace. In our study, we are interested in examining how adaptability within the workplace is correlated to subjective well-being, and if coping styles acts as a mediating or moderating variable. We will be using the Individual ADAPTability (IADAPT), Ways of Coping (WOC), and Satisfaction with Life Scale (SWLS) to measure the significance of our hypothesized connections between adaptability, coping styles, and subjective well-being. Our dataset consists of 475 undergraduate college students with 6 months of work experience, who were recruited from a large Midwestern university. We conducted our analyses at two levels: (a) global level, and (b) subscales of the target variables. We found that at the global level WOC does not mediate/moderate the relationship between IADAPT and SWLS. However, the IADAPT Uncertainty scale was significantly moderated by the WOC Seeking Social Support scale (b = .79, S.E. = .34, p = .02) and Distancing scale (b = .68, S.E. = .33, p = .038). Our study makes a contribution to the literature because if coping styles influences adaptability to create a happier life both in the workplace and in one's personal life, then there are practical implications for our study.

HOW IS THE EXTENSIVE TRADE GROWTH AFFECTED BY DIFFERENT FACTORS.
Paulo Pliego (Monmouth College)
Category & Time: Social, Behavioral, and Economic Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 414
Mentor(s): Qingqing Cao (Economics)

Our aim is to develop a macroeconomic model that will show the factors that impact the extensive trade margin in the United States after NAFTA. The importance of the study is to illustrate how trade agreements affect different industries that did not have great export market capability before an episode of trade liberalization. The reason why there is a concern on understanding the extensive trade margin is to improve macroeconomic models. This is done to combat the recent nationalistic ideology that tariffs are good for the American economy. Creating a better macroeconomic model will allow us to convince politicians the necessity of adopting a free trade ideology and moving away from tariffs. This project will analyse the factors that affect the growth of the extensive trade margin. Some of the factors are distance, tariffs reductions, language, port efficiency, etc. With these findings, there should be a better understanding of the effects of trade liberalization. The data will be collected from the UN Trade Statistics and the Economic Bureau of Economic Analysis. Collecting the data will allow us to classify the industries into intensive and extensive trade margin. We hypothesize that all the factors are statistically significant with tariff reduction having the biggest importance. The model will use an OLS regression line. The model should allow for a better understanding of bilateral trade when trade liberalization is enacted.

PARENTS' BELIEFS ABOUT EMOTIONS IMPACT CHILD PERCEPTION OF PARENT BEHAVIOR
Zoua Lor (St Olaf College)
Category & Time: Social, Behavioral, and Economic Sciences, Section 4, 2:30 PM - 3:45 PM
Poster: 415
Mentor(s): C. Emily Durbin (Psychology)

Emotion socialization is associated with mental health and well-being, behavioral problems, and emotion-related constructs like compassion and empathy, among other variables. The parent-child relationship is a critical source of emotion socialization for children, and emotion development inside the family unit impacts children's socio-emotional performance. Examining emotion socialization could lead to improvement in emotion treatment and training programs to reduce externalizing behaviors and support appropriate emotional competence. Although parents' perceptions and socialization behaviors have been explored in relation to children's emotional outcomes, little has been done on children's perception. Hence, the present study will investigate children's perception of their parent-child interactions in relation to parents' beliefs about emotions. This study will examine parent-child relationships for both fathers and mothers and their children who were participants in the Michigan Longitudinal Study. Our hypotheses are: 1) We expect that parents' greater transparency about emotional experiences will predict greater positive parent-child interactions, 2) We expect that the more parents believe that children's emotions are manipulative, the more negative their parent-child interactions, 3) We expect a mean-level difference across mothers' and fathers' beliefs about children's emotions, and differences for parents of girls versus boys.

COMMUNITY CONTEXT AND INDIVIDUAL OFFENDER CHARACTERISTICS INFLUENCE ON PROSECUTORIAL DECISIONS
Charlotte Mayeda (Beloit College)
Category & Time: Social, Behavioral, and Economic Sciences, Section 4, 2:30 PM – 3:45 PM
Poster: 416
Mentor(s): Mary A. Finn (Criminal Justice)

The community in which a criminal justice system resides in has important impacts on the decisions that are made by the varying actors within the system. The New York County criminal justice system is ideally situated in an area with a high population density and a diverse community, which makes the county different from others in the U.S. Although there have been significant studies in relation to racism within the criminal justice system, little data has been conducted on the role of prosecutors and even less data has been conducted on the

criminal justice system of New York County. These limitations in research have led us to examine whether the influence of racial/ethnic identity of defendants on prosecutorial decisions is conditioned by the attributes of the community in which the court resides. Using data from the New York County District Attorney's Office and the United States Census Bureau, we will examine variables such as the offender's race, socioeconomic status, gender, criminal history as well as the characteristics of the neighborhood in which they lived in prior to their arrest. In using a hierarchical linear model we predict that the racial/ethnic makeup of a neighborhood, the socioeconomic status and the crime rate will all impact prosecutorial decision in addition to the individual offender characteristics that have already been proven to have an influence on prosecutor's decisions.

TRACING PATHS AND MAKING SPACE: THE HISTORY OF THE LATINX COMMUNITY IN GRAND RAPIDS, MICHIGAN
Giselle Lora (Macalester College)
Category & Time: Social, Behavioral, and Economic Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 418
Mentor(s): Delia Fernandez (History)

In this study, we work to shift the dominant understanding of Latinx migration and labor history in the United States from a polarized East and West coast discourse, to one which includes the Midwest region. We will be focusing on the history of the Salvadoran, Guatemalan, and Dominican populations living in Grand Rapids, Michigan post 1970's. Our research is guided by three main objectives: 1) determine the pull and push factors that drove these groups to leave their home countries and travel to the Midwest 2) identify the industries that employed them 3) better understand their lived experiences based on race, class, and gender upon permanent settlement in the area. We conducted an in-depth literature review, an analysis of clerical records, census data, library archives, and oral history interviews with local Latinx community members. Using a mixed methods approach, We will specify the ways in which the Latinx community was able to create a space for themselves within a predominantly white conservative environment. We expect to find a trail of strong community organizing and networking in the face of various challenges individuals had to overcome by living outside of large immigrant cities such as New York, Chicago, or Los Angeles. In broadening the perception of the lived experiences of various Latinx sub-ethnic groups, this work will contribute to the recognition of the contribution, struggle, and presence of the Latinx community throughout the entire United States.

INCORPORATING 3D LEARNING INTO CLASSROOMS AND EXAMS
Samantha Luba (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 419
Mentor(s): Rebecca Matz (HUB for Innovation in Learning & Technology)

The first two years of college are the most important years for STEM majors. These classes make up the knowledge and skills STEM students need to build their future education on. Our course transformation project focuses on incorporating core ideas, crosscutting concepts, and scientific practices into science courses, and how this improves a student's retention of the material. Core ideas explain numerous facts and situations. They are important for figuring out problems and learning new material. Practices are scientific tools; such as making models, creating and conducting experiments, connecting scientific explanations using evidence, and mathematical reasoning. Cross cutting concepts link different areas of science. Three-dimensional learning refers to these three concepts integrated together: practices, core ideas, and crosscutting concepts. In this project, we video recorded multiple lectures from the 2013-14 and 2015-16 school years, a time period in which the three dimensions were starting to be increasingly implemented in some introductory science courses. We analyzed each moment of class in terms of how it was being taught. With this data we can see how active learning was done in the classroom. We also coded exams from the same school years for three-dimensional learning items. We correlated the three-dimensional learning concepts in our exam data to the teaching activities in the class being taught. We examined the data of the video recordings the exams, looking to see if there is any correlation between learning techniques in the classrooms and on the 3D learning items on the exams.

LOW PARTICIPATION OF TANZANIAN SECONDARY SCHOOL-GOING FEMALE STUDENTS IN COMPUTER CLUBS AND SCIENCE CLASSES: REASONS AND SOLUTIONS
Noushin Mahmood (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 420
Mentor(s): Jennifer Olson (Media and Information)

Using primary and qualitative research, this paper is written to figure out the reasons behind the low participation of Secondary school-going female students in Tanzania in Computer clubs and Science classes and to propose possible solutions for making them more encouraged and accessible to those resources. The article focuses upon the reflexivity of Tanzanian young girls around issues of education, subject choice, career choices, families, religion and communities and offers a better understanding about several stereotypes and social barriers to these women that might prevent their educational and professional success in higher studies in IT and science related fields.

PUERTO RICAN REMITTANCES: UNDERSTANDING INTERNAL ECONOMIC LINKS
Cristian Eduardo Martnez-Medina (University of Puerto Rico Rio Piedras Campus)
Category & Time: Social, Behavioral, and Economic Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 421
Mentor(s): Mariana Medina (Political Science)

Remittances are the capital that immigrants send back to their home countries. These consignments represent the second largest type of capital inflows in the world, after foreign direct investment and surpass foreign aid. However, internal migration is even more numerous than international immigrants and increasing in size in the US. Immigration to the continental US from PR is more numerous than many

other Latin American countries, and it is an example of internal migration because Puerto Ricans are American citizens. Previous research on Puerto Rican remitting behavior indicates a very different trend compared to other Latin American diasporas. Past research includes an analysis for international remittances, and our study will address the limitations and provide an analysis for domestic remittances. What is the economic effect of remittances from internal migration in PR? We hypothesize that there should be a positive correlation between net migration and remittances in PR. This study will employ the use of regression analysis, scatter plot, t-test to investigate how the increasing migration flows from PR to the US affect remittances in recent years, and analyze their economic consequences. Our early results disproved this hypothesis by explaining that there is a negative correlation between net migration and remittances in PR of -0.73 with a p-value of 0.01127. These results contradict all previous research about migration and remittances. These outcomes should inform Puerto Rican institutions to prioritize the creation of programs to improve the internal economic links within their diaspora to bring new capital injection to the island.

HOW CAREGIVERS' ROLE IN CHILDS' PLAY AFFECTS PARENT MENTAL STATE TALK
Michaella McBratnie (Michigan State University), Caroline Kane (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 422
Mentor(s): Claire Vallotton (Human Development & Family Studies)

Our prior research found, counter to expectation, that parent mental state talk decreased throughout toddlerhood. This study looks at variables that could explain this decrease. Caregivers' interpretations of the intentions behind children's behaviors using mental state talk motivates the child to communicate further (Buckley, 2003). The frequency of caregivers' mental state talk affects language acquisition (Meins & Fernyhough, 1999), attachment (Meins et al, 2011), and emotional regulation (Taumoepeau & Ruffman, 2006). Throughout toddlerhood children develop their communication and social skills that allow them to self-direct their play; as they take on a more active role in their play, this affects the caregiver's role (e.g., Fein & Fryer, 1995), specifically caregivers spend less time managing and directing children's play (Kane, 2017). In early toddlerhood parents focus their comments on children's desires and perception, then shift to talk more about emotion and cognition in later toddlerhood. Our prior study found an overall decrease in mental state talk despite children's increasing abilities to understand abstract language (McBratnie & Rusher, 2017). As children become more communicative and self-directive, parents may have less need to use mental state talk to interpret their child's intentions. Utilizing transcripts from 5-minute free play interactions when children were 12, 18, 24, and 30 months, I hypothesize that the mental state talk decreases over time as a result of the child taking on a more active role in both communication and play.

IMPROVING TYPE 1 DIABETES MANAGEMENT THROUGH VIDEO GAMES
Alexis McCarroll (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 423
Mentor(s): Bree Holtz (Advertising and Public Relations)

Approximately 200,000 American children and adolescents aged 0-20 years have type 1 diabetes (T1D). Proper management of T1D is very complex, requiring monitoring multiple daily blood glucose measurements, physical activity, carbohydrate intake, and adjusting insulin doses with multiple daily insulin injections or an insulin pump. Due to the complexity of management, there is often a lack of adherence to proper T1D management, which can result in poor health outcomes. One method to help combat poor outcomes is the use of video games to improve care. The study's purpose was to seek out aspects of video games adolescents found engaging to create an educational game for T1D. Thirty adolescents with T1D were given one of five games that each served to educate players on a specific aspect of diabetes. After gameplay, participants completed a survey that collected information on their age, level of engagement, suggestions, and existing games that the participants frequently play on their phones or tablets. While there were many positive responses regarding the games' educational aspects, participants provided negative feedback on the following: (1) difficulty of managing controls, (2) repetitiveness of actions, or (3) complexity of instructions. Additionally, participants favored competitive games, which suggests higher engagement levels due to the motivation to win. The outcomes of this study suggest that a successful T1D game would include simple controls, actions, and instructions paired with a variety of different actions, tasks, and competition, which are necessary to maintain the players' engagement with the game and encourage future gameplay.

AUTOMATED HUMAN RIGHTS REPORT SCORING: DOES CLEANER TEXT LEAD TO BETTER ACCURACY?
Aliyah McIlwain (Lincoln University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 5, 2:30 PM - 3:45 PM
Poster: 424
Mentor(s): Michael Colaresi (Political Science)

The United States State Department has produced reports for the assessment of human rights for approximately 195 countries every year since 1976. These reports are then quantitatively scored using the Political Terror Scale (PTS) and the Cingranelli-Richards (CIRI) index to assess how abusive a country is to its citizens. It is been suggested that there has been a shift in political attention since then. Political attention in regards to human rights should be reflected in the text of human rights reports; therefore; a shift in attention should reflect a shift in textual content. Different textual features in a report are expected to yield a different score. Our goal is to use supervised learning techniques to better track those shifts and in-turn more accurately assess the reports over time. Supervised learning (SL) attempts to develop a mathematical representation of a process where input features, like text, predict a response value, in our case PTS scores. A large component of our supervised learning problem is the use of text as data. Most that similarly attempt our problem use messy text that has spelling errors and extraneous symbols, possibly skewing their results as the computer cannot read the text as intended. We hope to get more accurate results by creating a computer program that pre-cleans the text. Overall, we expect to find that the input feature of lexical text will correlate to different scores as time increases, indicative of a shift in attention.

DIFFERENTIAL RELATIONSHIPS BETWEEN OBSESSIVE COMPULSIVE DISORDER SYMPTOM DIMENSIONS AND ERROR MONITORING BRAIN ACTIVITY
Natasha Mendez Albelo (Universidad Metropolitana)
Category & Time: Social, Behavioral, and Economic Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 427
Mentor(s): Jason Moser (Psychology)

Obsessive Compulsive Disorder (OCD) is a psychological disorder that manifests itself when a person has uncontrollable distressing thoughts (obsessions) that are not relieved unless they perform actions that are repetitive (compulsions). OCD is related to several neurocognitive abnormalities, one of which being error monitoring. Error monitoring can be indexed by electrophysiology using the error-related negativity (ERN). OCD is characterized by enlarged ERN; however, OCD is not a unitary problem, but rather is characterized by unique subtypes (e.g., washing vs. counting). Symptom subtypes show different neurocognitive abnormalities. Unfortunately, past studies have not established a clear relationship between the subtypes of OCD symptoms and ERN. This study aims to address this gap by examining relationships between different OCD symptoms and ERN across a one-month timespan, to determine their stability. Thirty-one women completed a self-report measure of OCD symptom dimensions and a two-choice reaction time task during which their ERN was measured four times across a month's period. Results revealed that washing symptoms were uniquely related to an enlarged ERN whereas counting symptoms were uniquely related to a reduced ERN. No other symptom dimensions (e.g., hoarding, checking) were related to ERN; however, these findings suggest a more specific relationship between OCD symptoms and ERN. These findings show that washing and counting symptoms have unique and opposing relationships to the ERN—possibly suggesting that they have different neurocognitive impact.

THE IMPACT OF CONSTRUCTION SAFETY TRAINING ON IMMIGRANT INTEGRATION IN THE CITY OF DETROIT
Jair Moreira (Hunter College City University of New York)
Category & Time: Social, Behavioral, and Economic Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 428
Mentor(s): Laura Reese (Political Science), Mark Wilson (School of Planning, Design and Construction)

In the absence of a national plan for immigrant integration and in the presence of a hostile federal environment towards immigration, many cities throughout the United States have taken the lead to promote immigrant incorporation. Such is the case of the reemerging immigrant destination of Detroit that in 2015 opened their office of Immigrant Affairs. In 2017, Detroit announced their redevelopment plan "one city for all of us" under the guiding principle of "everyone is welcome in our city" as a way to reaffirm the importance of immigration growth and integration for the next 50 years. This study will explore immigrant integration in the city of Detroit, by testing the basic hypothesis that construction safety training promotes greater incorporation of immigrant workers. We will investigate our rational through (1) spatial mismatch, (2) injuries and fatalities, and (3) political incorporation. We will use a survey, based on literature about the previously mentioned elements, in order to gather data from native and foreign construction workers in the city of Detroit. The survey will be distributed in specific census tracts in Detroit based on observations from the American Community Survey on occupation, and Native/Foreign born. The data will be examined through multiple t-tests that will differentiate between foreign born construction workers and native born construction based on their safety training status. We expect our findings to support our hypothesis which will lead us provide policy recommendations that will help Detroit's efforts to attract and integrate new immigrants.

DOES CULTURE MODERATE THE EFFECT OF PARENTING STYLE ON CHILDREN'S DEVELOPMENT?
Rachel Nelson (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 429
Mentor(s): Claire Vallotton (Human Development & Family Studies)

Due to its importance for cognition and communication, language skills are some of the most important skills you need throughout life (Homer & Tamis-LeMonda, 2013). However, the parenting style that produces the most benefical results differs between cultures (Bornstein, M. H., 2012). A previous study including families from the U.S and Chile has shown that Authoritative parenting (Baumrind, 1971) is associated with higher language and social skills (Nelson & Alhagri, 2017). This project will explore further into parenting styles' effects on language and social development by testing whether these effects are moderated by culture. I hypothesize that culture will moderate the effects parenting style has on children's developmental skills across domains. Chile and the U.S were compared, and linear regression models were used to test whether culture moderates parenting styles. Socio-economic status and children's language and social scores at 12 months were controlled for in order to predict language and social skills at 30 months.

DOES THE AGE OF CHILD CARE ENROLLMENT AFFECT THE RELATIONSHIP BETWEEN BREASTFEEDING BEHAVIOR AND MATERNAL SENSITIVITY?
Chuhao Nie (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 430
Mentor(s): Claire Vallotton (Human Development & Family Studies)

Prior studies have examined associations between breastfeeding behavior and maternal sensitivity, but few studies have examined this relationship in the context of child care. Enrolling in child care can have numerous effects on both mother and the developing child. One study conducted in Israel showed that center-care infants were more likely to become insecurely attached to their mother as compared with infants who were in maternal care. In our study, we tested whether the differences in the age of child care enrollment have effects on breastfeeding behavior and its relationship with maternal sensitivity. Possible causes of variation include less time spent on skin-to-skin

contact between mother and child, or simply the mother is less available to breastfeed the child in the daycare facility. In the current study, participants were selected from child care centers located in Midwest USA and central Chile. Maternal sensitivity data was assessed via a 5-minute mother-infant free play at which was recorded and later coded. The duration of breastfeeding and the age of child care enrollment were collected through a self-report questionnaire. Linear regression analysis was used to investigate the relationship between maternal sensitivity and breastfeeding duration, and whether this relationship is moderated by the age of child care enrollment. The analyses controlled for background variables including maternal education, socioeconomic status, and birth order.

CLINICIANS' UNDERSTANDING OF RACE-BASED RISK IN A DIABETES CLINIC
Funmi Odumosu (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 431
Mentor(s): Linda Hunt (Anthropology)

It is commonly assumed, both within and outside of medicine, that race or ethnicity can be used to assess a person's genetic risk for certain diseases. Although many studies have shown this to be false, clinicians still commonly use race/ethnicity as a proxy to evaluate individual risk for particular diseases said to have strong genetic basis, such as diabetes. Drawing on ethnographic interviews and participant observation conducted with patients and clinicians at a diabetes and weight management clinic, we will explore clinicians' perspectives about genetic risk and analyze how they determine and use patient race/ethnicity when giving care to diabetes patients. We will further investigate the clinical and social implications this may have on treatment choices and decisions, on patients' overall health and well-being, and on broader issues of discrimination and equity in health care.

LATINX REFRAMING MEDIA NARRATIVES: EDUCATION
Magaly Ordonez (California State University Dominguez Hills)
Category & Time: Social, Behavioral, and Economic Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 432
Mentor(s): Maria Isabel Ayala (Sociology)

The United States' presidential budget proposal for the 2018 fiscal year includes 9.2 billion dollars in budget cuts to education (Kamenetz 2017). Given that educational attainment is considered one of the key factors for people's socioeconomic mobility, these cuts represent an added barrier to the economic advancement of populations of color -i.e. Latinx and African Americans-for whom higher educational attainment is the lowest (Lopez & Fry, 2013; Ryan& Bauman,, 2016). We use the "x" as the suffix for the term Latina/o to be inclusive of gender non-conforming folks within the community to disrupt embedded quotidian language binaries. Unfortunately, in mainstream media outlets, the negative framing of Latinxs communities, specifically their educational attainment, is prevalent. Yet, at the micro level, Latinxs communities across the nation challenge stereotypical representation of being "unsuccessful", "unmotivated" and financially dependent on federal money by advocating for educational equity and graduating from educational institutions in larger numbers (Lopez & Fry, 2013). Furthermore, this demographic growth and alternative narrative is observed in growing Hispanic media outlets who reframe the conversation on Latinxs' education. To contribute to the discussion on reframing, in this paper, we explore how the 2015 top "Hispanic" newspapers (Pew Research Center), as a med genre, reframe Latinx educational attainment and in doing so, embody narratives of resistance. Through a critical discourse analysis guided by Critical Race Theory, Latina/o Critical Race Theory, Critical Media Literacy and Latina/o Feminist Media Studies, we will expose newspaper media narratives of Latinxs communities reframing Latinx education.

DISORDERED EATING SCREENING FOR ATHLETES
Moshiur Rahman (Michigan State University), Andrew Lee (Michigan State University), Ali Moshrefi (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 6, 2:30 PM - 3:45 PM
Poster: 433
Mentor(s): Samantha Kennedy (Psychiatry)

Disordered eating (DE) is a subclinical spectrum of abnormal eating behaviors that can lead to eating disorders (EDs): a growing problem among athletes that adversely affects physical and mental health as well as athletic performance. EDs are associated with increased risk for mood, anxiety, impulse-control, and substance use disorders leading to extremely high mortality rates. Screening tools exist to diagnose these disorders, but these tools are designed only for female athletes. Our research hopes to develop a screening tool, the Disordered Eating Screening for Athletes (DESA-6), consisting of 6 questions and is designed to identify adult athletes of both genders and all ages possibly at risk for disordered eating. All athletes over the age of 18 were recruited through the MSU Sports Medicine Clinic in East Lansing, MI. Athletes of all sports were included in data collection. Participants were issued a survey that consisted of three brief sections and which often took less than 5 minutes to complete. In the first section, athletes were asked demographic information including age, primary sport, height and current weight. The second section contained the DESA-6, and the third section consisted of the EAT-26, which is a validated and reliable self-report questionnaire assessing the risk of disordered eating. No identifying information was collected throughout the questionnaires. Analyses so far indicate relative reliability, internal consistency and discriminants as well as concurrent validity of the DESA-6 in relation to the EAT-26.

THE MEASUREMENT OF NEIGHBORHOOD SOCIOECONOMIC CHARACTERISTICS AND HISPANIC AND WHITE RESIDENTIAL SEGREGATION IN METROPOLITAN DETROIT
Luis Rubalcava (California State Polytechnic University Pomona)
Category & Time: Social, Behavioral, and Economic Sciences, Section 7, 2:30 PM - 3:45 PM
Poster: 435
Mentor(s): Joe T Darden (Geography)

Few studies have focused on the residential segregation of Hispanics in Metropolitan Detroit, and no study has focused on residential segregation of Hispanics by socioeconomic status of the neighborhoods in which they live. The purpose of this study is to determine the extent of residential segregation between Hispanics and Non-Hispanics whites by neighborhood socioeconomic characteristics in Metropolitan Detroit. It is hypothesized that: (1) residential segregation of Hispanics from Non-Hispanic whites is moderate to high regardless of socioeconomic characteristics where the two groups reside and (2) Hispanics are disproportionately located in neighborhoods of low socioeconomic characteristics and whites are located disproportionately in neighborhoods of high socioeconomic characteristics, thus resulting in the inequitable distribution of Hispanics in more disadvantaged neighborhoods in the Detroit Metropolitan area. Using data obtained from the 2011-2015 5 year estimates US Bureau of the Census American Community Survey, two methods were employed to measure the extent of Hispanic residential segregation by socioeconomic status of neighborhoods. The methods were (1) the Modified Darden-Kamel Composite Socioeconomic Index (CSI) to assign a socioeconomic position (SEP) to each census tract in the Detroit Metropolitan area in order to determine neighborhood quality, and (2) the Index of Dissimilarity to measure the extent of unevenness in the spatial distribution between Hispanics and Non-Hispanic whites over neighborhood quintiles. Results have implications for public policy.

RACIAL TARGETING AMONG YOUTH
Victor A Ruiz-Divas (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 7, 2:30 PM - 3:45 PM
Poster: 436
Mentor(s): Terry Flennaugh (Teacher Education)

We currently live in a socially constructed society. A socially constructed society is a society that is created through shared views and assumptions that sets what is mainstream and what is not in a society. With the increase of hate and discrimination against marginalized groups currently going around American society, it has led many people to develop negative and discriminative mindsets and behaviors. With the exposure to negative, bigoted, and outright racist views on marginalized groups, children and adolescents develop their minds around these mindsets. This can lead to negative views towards their peers in school. Which can result to racial targeting through chants, vandalism, and blatant altercations. This paper examines the racial targeting of Black and Hispanic students in American public middle and high schools and focuses on how teachers and administrators respond to these racial aggressions from 2016 to 2017. It's important to see how our teachers and administrators respond to these issues. It's also important to see how teachers and administrators are trained to respond to these issues. Some of the methods used to conduct research on this topic include; news article research, peer-reviewed scholarly article research, and interviews with students, teachers, teacher educators, and administrators.

WHO'S IN CONTROL: A VARIABLE INTERACTION STUDY ON HOW ANGER AFFECTED POLICY ATTITUDES IN THE 2016 ELECTION
Xavier Scruggs (University of Montevallo)
Category & Time: Social, Behavioral, and Economic Sciences, Section 7, 2:30 PM - 3:45 PM
Poster: 437
Mentor(s): Daniel Bergan (Communication)

Research shows that emotions affect decision making, cognition, and policy attitudes. However, there is a dearth of information on how emotions shaped policy attitudes in the 2016 election. This project proposes to understand the role that anger played in the election and if there is a relationship between anger and policy attitudes in the 2016 election. We hypothesized that anger does play a role in shaping policy attitudes. We obtained the election dataset questionnaires and answers from the American National Election Studies, where respondents identified their emotion and stated support/opposition to a policy. We used bivariate statistics to explore the relationship between anger and policy attitudes, including attitudes about the Syrian Refugee program and federal spending for welfare assistance, science and technology, and child care. Preliminary results show that among both Democrats and Republicans, as anger increased toward Obama the opposition to the Syrian Refugee program grew stronger. The results support existing literature that anger does affect one's policy judgments and decision-making.

POLICE OFFICER TRAINING AND RACE BIAS IN THE DECISION TO SHOOT
Aubrey Stechschulte (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 7, 2:30 PM - 3:45 PM
Poster: 438
Mentor(s): Joseph Cesario (Psychology)

Of wide public concern is the possibility that police officers are more likely to use deadly force against unarmed black citizens compared to unarmed white citizens, as portrayed largely by the media. One way of testing this is through controlled experimental laboratory tasks. Past research using computerized tasks has found that participants are indeed more likely to shoot unarmed black targets than unarmed white targets. Weaknesses of this past work include: (1) the use of untrained undergraduates as participants, rather than actual police officers and (2) the use of computerized tasks with low external validity (participants see pictures of people and press computer buttons to respond). The present research addresses these weaknesses and tests the role of training in police recruit decisions. Police recruits from a large midwestern police force performed in a shooting simulator once before and again after their firearms training at the police academy. The

shooting simulator presented recruits with videos of black or white targets (males and females) quickly pulling out either guns or harmless objects from behind their backs. Recruits were instructed to shoot armed targets, using a modified handgun that recorded both whether or not the recruit fired and how quickly the recruit fired. In this way we could test whether officers were more likely to shoot unarmed black targets, how reaction times varied across race of target, and whether training impacted this bias. Results showed no race bias using this more realistic task and showed that training overall improved performance by reducing errors.

CHINESE BRANDS IN U.S.
Xinyi Tao (Michigan State University), Xinrui Feng (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 7, 2:30 PM - 3:45 PM
Poster: 439
Mentor(s): Hairong Li (Advertising and Public Relations)

Indicate the analyses of successful Chinese brands which has been stepped into U.S. market through past several years. The analysis of those Chinese Brands' social media, category and advertising strategy will also be given.

CURRICULAR INTEGRATION: LINKING SCIENTIFIC LITERACY AND STANDARD LITERACY IN GENERAL EDUCATION SCIENCE COURSES
Della Uekert (Michigan State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 7, 2:30 PM - 3:45 PM
Poster: 440
Mentor(s): Claudia Vergara (Center for Integrative Studies)

Standardization processes guide businesses and organizations in implementing practices that are sustainable for the environment, the economy and society. They affect global challenges such as managing water and food resources equitably, while maintaining safety and efficiency. Our goal is to incorporate standard literacy into general science courses at Michigan State University. Specifically, students will understand; 1) the process to create, implement and regulate standards; 2) the implications (economic, social, political) of standardization; 3) the role of science and the scientific process in standard development. To achieve these objectives, we developed standard literacy modules in two laboratory courses in the Center for Integrated Studies in General Science (CISGS), ISB 208L and ISP 203L, considering that more than one half of MSU undergraduates move through this course structure. We will present the analyses of our data including student surveys, collected at the beginning and end of the courses, and artifacts—assignments and debates—related to the standard instructional module. Our results indicate that participation in the standards module contributes to increased awareness about the important role that standards play in our daily lives. For example, when asked to "Explain how Standards are created, implemented and regulated" a student [post survey] indicated, "[…] standards are proposed, thoroughly debated, and then have to be approved before they can be implemented by specific fields. They are maintained by consequences being enforced for not following them." In this response, the student draws on several components of the process: stakeholders, debate, regulation, and compliance.

FARM TO COLLEGE IN MICHIGAN UNIVERSITIES
Kyeesha Wilcox (Middle Tennessee State University)
Category & Time: Social, Behavioral, and Economic Sciences, Section 7, 2:30 PM - 3:45 PM
Poster: 441
Mentor(s): Colleen Matts (Community Sustainability), Richard Pirog (Community Sustainability)

The Farm to School (FTS) initiative, serving K-12 schools, has been successful throughout Michigan and the U.S. FTS focuses on getting more local foods into school food programs. However, the Farm to College (FTC) initiative, created for higher education institutions, has had less momentum within Michigan universities. The overall purpose of this project is to understand how many Michigan universities have food service operations and their interest in local food purchasing, including motivators and barriers. Three activities will lay the groundwork for completing this project: site visits, phone calls to universities and development of an electronic survey poll and methods. The site visits will include observations of the universities' local food use-frequency and identification of local vendors on campus. After the tours of Michigan State University and University of Michigan, two schools already committed to FTC programs, the schools' observations and interviews will be analyzed to understand the opportunities, barriers and goals to participate in the Farm to College program. Previous FTS survey questions will be examined to reformat questions into more fitting ones for Michigan universities' food service directors and buyers. This project is intended to act as a foundation for MSU's Center for Regional Food Systems' (CRFS) research and goal of increasing FTC programs in Michigan. With the goal of increasing local food usage in Michigan universities, MSU's CRFS aims to offer university students, staff and visitors the opportunity to have increased access to local, healthy foods.

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