UNIVERSITY UNDERGRADUATE RESEARCH
& ARTS FORUM

UURAF

2019

APRIL 5 · MICHIGAN STATE UNIVERSITY

WELCOME

Welcome to the 21st annual University Undergraduate Research and Arts Forum at Michigan State University. Throughout the day, undergraduate students from diverse academic disciplines will present their outstanding research and creative endeavors. This forum is the largest in the event's history, with over 920 students from 14 different colleges participating today. These students were mentored by more than 600 faculty members.

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.

Many have contributed to make this growing event a success. We offer special thanks to the UURAF planning team: Jessica Diaz, Amanda Flores, and Faleesia Willis from the Undergraduate Research Office, for assisting with the coordination of this event and to the many staff members from across campus who volunteered their time. The cover art was designed by Nikki Dallich, a Graphic Design major in the College of Arts and Letters and a member of the AIGA Detroit MSU student group.

UURAF received support, guidance, and planning from Interim Associate Provost Mark Largent; Dean Cynthia Jackson-Elmoore from the Honors College; several undergraduate associate and assistant deans; Dr. Korine Wawrzynski, Assistant Dean, Academic Initiatives, and Director, Undergraduate Research; Lizzy King, Assistant Director, Undergraduate Research; and Heather Dover, Coordinator, Undergraduate Research. We thank the many dedicated mentors who guided the research projects and creative activities presented today, the faculty members serving as judges, the graduate students and postdoctoral fellows providing feedback, and the many volunteers.

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

Undergraduate Research
MICHIGAN STATE UNIVERSITY

AWARDS CEREMONY – April 10, 2019

Please join us on Wednesday, April 10th at 3:30 PM for the awards ceremony in the Ballroom of the Union during which the prize winners in the various categories will be announced. We encourage all participants to join us for the awards ceremony and to invite their families, friends, mentors, and faculty members to attend.

To recognize exemplary scholarly achievements, monetary prizes will be awarded. One first-place award ($100) will be given in each section. Students working together in groups of four or less will each receive the award money independently. The maximum amount awarded for groups with five or more members will be $400, and the award money will be evenly distributed amongst the group members. Award money will be deposited directly into the student's MSU account.

First-place award recipients will be considered for the grand prize award, which will be announced in early summer. All first-place award recipients will be contacted to submit a brief paper on their UURAF program topic and an electronic version of their poster or oral presentation. The Editorial Board and staff members for the *Red Cedar Undergraduate Research Journal* (*ReCUR*) will review submissions. A total of two grand prizes ($500 each) will be awarded to one program from the science and engineering categories and one program from the humanities, social sciences, and communication arts and sciences categories.

Undergraduate Research Ambassador Program

The Undergraduate Research Ambassador program prepares current undergraduate researchers to facilitate workshops, represent the office at events, assist at UURAF, and provide feedback to the staff on current and proposed program offerings. In addition to the ambassador-led Undergraduate Research Office sponsored workshops each semester, the ambassadors are frequently invited to present during classes and student academic society meetings across campus as well. The 2018-19 Undergraduate Research Ambassadors include:

Katie Anderson
Maddie Bross
Kyleigh Buckley
Sadhana Chinnusamy
Jasmine Czajka
Katie Edwards
Gabby Huizinga
Erin Keller
Brandon Llewellyn
Kiera McRae
Don Nguyen
Jacqline Njeri

Applications for the Undergraduate Research Ambassador program for the 2019-20 academic year are being accepted until Wednesday, April 10th at 11:59 PM. Visit urca.msu.edu/ambassadors for more information.

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SCHEDULE OF EVENTS

All events take place in the MSU Union

TIME	EVENT	LOCATION
ORAL PRESENTATIONS: SESSION 1, 8:30 AM – 10:30 AM		
8:00 – 8:15 AM 8:30 – 10:30 AM	Presenter Check-In Oral presentations delivered throughout the session	2nd Floor Concourse
POSTER PRESENTATIONS: SESSION A, 9:00 AM – 10:30 AM		
8:30 – 9:00 AM 9:00 – 10:30 AM 10:30 – 10:45 AM	Presenter poster set-up in assigned locations Display and judging time for posters Students take down their posters	Ballroom (2nd Floor) Lake Huron Room (3rd Floor)
ORAL PRESENTATIONS: SESSION 2, 11:00 AM – 1:00 PM		
10:30 – 10:45 AM 11:00 AM – 1:00 PM	Presenter Check-In Oral presentations delivered throughout the session	2nd Floor Concourse
POSTER PRESENTATIONS: SESSION B, 11:00 AM – 12:30 PM		
10:45 – 11:00 AM 11:00 AM – 12:30 PM 12:30 – 12:45 PM	Presenter poster set-up in assigned locations Display and judging for posters Students take down their posters	Ballroom (2nd Floor) Lake Huron Room (3rd Floor)
POSTER PRESENTATIONS: SESSION C, 1:00 PM – 2:30 PM		
12:45 – 1:00 PM 1:00 – 2:30 PM 2:30 – 2:45 PM	Presenter poster set-up in assigned locations Display and judging for posters Students take down their posters	Ballroom (2nd Floor) Lake Huron Room (3rd Floor)
ORAL PRESENTATIONS: SESSION 3, 1:30 PM – 4:00 PM		
1:00 – 1:15 PM 1:30 – 4:00 PM	Presenter Check-In Oral presentations delivered throughout the session	2nd Floor Concourse
POSTER PRESENTATIONS: SESSION D, 3:00 – 4:30 PM		
2:45 – 3:00 PM 3:00 – 4:30 PM 4:30 – 4:45 PM	Presenter poster set-up in assigned locations Display and judging for posters Students take down their posters	Ballroom (2nd Floor) Lake Huron Room (3rd Floor)

ORAL PRESENTATION SCHEDULE

8:30 AM – 4:00 PM

CATEGORY	SECTION	TIME	LOCATION
Agriculture & Animal Science	5	1:30 – 3:15 PM	Lake Superior Room
Business	3	11:00 AM – 12:45 PM	Lake Michigan Room
Cell Biology, Genetics, & Genomics	5	8:30 – 10:00 AM	Lake Michigan Room
Cell Biology, Genetics, & Genomics	6	1:30 – 3:00 PM	Lake Michigan Room
Communication Arts & Sciences	5	8:30 – 10:00 AM	Lake Erie Room
Digital Media	1	11:00 AM – 12:00 PM	Lake Erie Room
Digital Media	2	1:30 – 2:30 PM	Lake Erie Room
Education	5	8:30 – 10:15 AM	Mosaic Multipurpose Room
Environmental Science & Natural Resources	5	8:30 – 9:45 AM	Room 30
Food Science & Human Nutrition	3	8:30 – 10:15 AM	MSU Room
History, Political Science, & Economics	2	3:00 – 4:00 AM	Lake Erie Room
Humanities	2	11:00 AM – 12:45 PM	MSU Room
Integrative & Organismal Biology	4	1:30 – 2:30 PM	Room 30
Kinesiology	4	8:30 – 9:45 AM	Lake Superior Room
Kinesiology	5	11:00 AM – 12:15 PM	Lake Superior Room
Microbiology, Immunology & Infectious Disease	5	1:30 – 2:45 PM	Room 36
Neuroscience	5	1:30 – 2:45 PM	MSU Room
Physical Sciences	6	8:30 – 9:45 AM	Room 36
Plant Sciences	4	11:00 AM – 12:30 PM	Room 36
Psychology	8	11:00 AM – 12:15 PM	Room 30
Social Sciences: General	4	8:30 – 10:00 AM	Lake Ontario Room
Social Sciences: General	5	11:00 AM – 12:30 PM	Lake Ontario Room
Social Sciences: General	6	1:30 – 3:00 PM	Lake Ontario Room
Sociology	3	11:00 AM – 12:15 PM	Mosaic Multipurpose Room
Visual & Performing Arts	3	1:30 – 3:15 PM	Mosaic Multipurpose Room

POSTER PRESENTATION SCHEDULE

Session A: 9:00 AM – 10:30 AM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	1	Ballroom
Biochemistry & Molecular Biology	1 & 2	Ballroom
Business	1	Ballroom
Cell Biology, Genetics, & Genomics	1	Ballroom
Communication Arts & Sciences	1	Ballroom
Education	1	Ballroom
Engineering, Computer Science, & Mathematics	1	Ballroom
Environmental Science & Natural Resources	1	Ballroom
Epidemiology & Public Health	1	Ballroom
Integrative & Organismal Biology	1	Lake Huron Room
Kinesiology	1	Lake Huron Room
Linguistics, Languages, & Speech	1	Ballroom
Microbiology, Immunology, & Infectious Disease	1	Ballroom
Neuroscience	1	Lake Huron Room
Physical Sciences	1	Lake Huron Room
Plant Sciences	1	Lake Huron Room
Psychology	1 & 2	Lake Huron Room
Sociology	1	Lake Huron Room
Visual & Performing Arts	1	Ballroom

Session B: 11:00 AM – 12:30 PM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	2	Ballroom
Biochemistry & Molecular Biology	3	Ballroom
Cell Biology, Genetics, & Genomics	2	Ballroom
Communication Arts & Sciences	2	Ballroom
Education	2	Ballroom
Engineering, Computer Science, & Mathematics	2 & 3	Ballroom
Environmental Science & Natural Resources	2	Ballroom
Epidemiology & Public Health	2	Ballroom
Food Science & Human Nutrition	1	Ballroom
Integrative & Organismal Biology	2	Lake Huron Room
Kinesiology	2	Lake Huron Room
Microbiology, Immunology, & Infectious Disease	2	Ballroom
Neuroscience	2	Lake Huron Room
Physical Sciences	2 & 3	Lake Huron Room
Psychology	3 & 4	Lake Huron Room
Social Sciences: General	1	Ballroom
Toxicology & Pharmacology	1	Lake Huron Room
Visual & Performing Arts	2	Ballroom

POSTER PRESENTATION SCHEDULE

Session C: 1:00 PM – 2:30 PM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	3	Ballroom
Biochemistry & Molecular Biology	4	Ballroom
Cell Biology, Genetics, & Genomics	3	Ballroom
Communication Arts & Sciences	3	Ballroom
Education	3	Ballroom
Engineering, Computer Science, & Mathematics	4 & 5	Ballroom
Environmental Science & Natural Resources	3	Ballroom
Epidemiology & Public Health	3	Ballroom
Kinesiology	3	Lake Huron Room
Microbiology, Immunology, & Infectious Disease	3	Ballroom
Neuroscience	3	Lake Huron Room
Physical Sciences	4 & 5	Lake Huron Room
Plant Sciences	2	Ballroom
Psychology	5	Ballroom
Social Sciences: General	2 & 3	Lake Huron Room
Sociology	2	Lake Huron Room
Toxicology & Pharmacology	2	Lake Huron Room

Session D: 3:00 PM – 4:30 PM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	4	Ballroom
Anthropology	1	Ballroom
Biochemistry & Molecular Biology	5	Ballroom
Business	2	Ballroom
Cell Biology, Genetics, & Genomics	4	Ballroom
Communication Arts & Sciences	4	Ballroom
Education	4	Ballroom
Engineering, Computer Science, & Mathematics	6	Ballroom
Environmental Science & Natural Resources	4	Ballroom
Food Science & Human Nutrition	2	Ballroom
History, Political Science, & Economics	1	Ballroom
Humanities	1	Lake Huron Room
Integrative & Organismal Biology	3	Lake Huron Room
Linguistics, Languages, & Speech	2 & 3	Ballroom
Microbiology, Immunology, & Infectious Disease	4	Lake Huron Room
Neuroscience	4	Lake Huron Room
Plant Sciences	3	Lake Huron Room
Psychology	6 & 7	Lake Huron Room
Social Work	1	Lake Huron Room

PRESENTATION SCHEDULE

Presentations are organized by category and then by section, followed by presentation number. Poster presentations are listed first, followed by oral presentations. A PDF version of the book is posted on our website at https://urca.msu.edu/uuraf.

AGRICULTURE & ANIMAL SCIENCE

SUSTAINABLE NEMATODE CONTROL STRATEGIES IN CUCURBITS
Lauren Rodriguez
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 1
Mentor(s): Kristin Poley, Marisol Quintanilla Tornel

The integration of certain cover crops can improve the overall soil health of a field and reduce plant-parasitic nematode populations. Sunn hemp (Crotalaria juncea), a tropical legume used as a cover crop in the Southern United States, produces the toxic nematicidal compound monocrotaline, which acts as natural pest control when soil incorporated. Sunn hemp has not been shown to host Southern root knot nematodes. We are seeking to evaluate its host status to Northern root lesion nematodes (Pratylenchus penetrans) specifically in cucurbits crops. Root lesion nematodes are common in Michigan. Pending host status with adverse nematode species, sunn hemp could be employed as a cover crop after harvest of a Michigan short-season crop. We expect sunn hemp to be a host for root lesion nematodes as preliminary field trials resulted in an increase in root lesion after sunn hemp. A replicated greenhouse experiment was conducted to test the host-capabilities of sunn hemp with temperate plant-parasitic nematodes. Soil was inoculated with a root lesion nematode, Pratylenchus penetrans incognita, prior to planting. After eight weeks of growing, soil which these plants were grown in was processed and analyzed for parasitic impact. From these experiments, we can infer the host status of sunn hemp to two important plant-parasitic nematodes in Michigan, and determine the effect of this cover crop on control of nematodes through biofumigation.

POLYPHENOLIC PROFILING OF GRASS-FINISHED BEEF AND ITS RELATIONSHIP WITH BETA-CAROTENE
Carlos Diola
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 2
Mentor(s): Jenifer Fenton

Dietary polyphenol intake is associated with positive health effects in humans. These compounds possess potent antioxidant and anti-inflammatory properties associated with mitigating disease risk. While the health benefits of beef consumption are controversial, beef from complex grass-fed/finished cattle with known forage composition is proposed to have a more favorable nutrient profile including higher omega-3 fatty acids, vitamin-E, and beta-carotene than single grass-fed. However, little is known about how polyphenol composition of beef changes when comparing nutrients in beef. Beta-carotene (BC) is a precursor to the fat-soluble vitamin A. Due to the similar structure to polyphenols, it is hypothesized that beef containing higher amounts of BC will contain more phenolic compounds. The aim of this study is to characterize the polyphenol composition of beef samples with high and low amounts of BC. Twenty beef samples containing varying amounts of beta-carotene were divided into groups of ten high/low BC sub-groups. Beef samples were frozen in a -80C refrigerator after collection. Samples were broken up, weighed, and pre-treated with methanol and pH=7 potassium phosphate buffer containing L-ascorbic acid and EDTA to protect polyphenols from oxidation during extraction. Beef extracts were then fractionated into four polyphenol classes: phenolic acids, anthocyanins, proanthocyanidins, and flavanols with C-18 columns in reverse phase chromatography (RPC). Fractions were transferred to a 96-well plate and respective polyphenol levels were quantified through microplate UV-Vis spectroscopy. Flavanols in quercetin equivalents (QE) and phenolic acids in gallic acid equivalents (GAE) were detected in varying amounts across samples.

EVOLUTION OF PATHOGENICITY IN FUNGI THROUGH EXPLORATION OF SPORE GERMINATION GENES.
Claudia Petrucco
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 3
Mentor(s): Frances Trail

Fungi make up a large component of agriculturally important plant pathogens and result in quality and yield lost. Spore germination constitutes the first step of the disease cycle, yet little is known on the underlying genetics across species. The aim of this study is to determine the evolutionary history of spore germination in Fusarium graminearumand Magnaporthe oryzaeby analysis of orthologous genes in fungal plant pathogens. Six fungal species underwent transcriptomic analysis in vitroand in plantato identify orthologous genes showing far greater expression in one lineage compared to the others. Gene knockouts were conducted and carried out on those genes highly expressed in their specific lineage, and positive transformants were confirmed via PCR checks on gDNA and cDNA. Deletion mutants were then phenotyped in vitroand in planta and compared to the wild-type strain for differences in their spore structure and functions. Deletion mutants from a variety of genes displayed a range of knockout phenotypes during plant infection, spore development and maturation, and conidia morphology, production, and growth. The genes studied provide potential targets for disease control in the vital stage of the disease cycle.

SEASONAL VARIATIONS IN MACRO-AND MICRO-MINERAL CONTENT OF GRASS-FINISHED BEEF
Srikar Kesamneni
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 4
Mentor(s): Jenifer Fenton

Consumer interest in grass-finished beef (GFB) has garnered a lot of interest in the past decade, evidenced by retail sales reaching $272 million in 2016. Variations in mineral levels of GFB by producers nationwide, and by season, is poorly documented. Here, we investigate the mineral content of GFB marketed to consumers throughout the US. Producers across the US were asked to send samples from cattle finished in spring and fall. Mineral content of the samples from 4 producers was quantified using coupled plasma mass-spectrometry. Macrominerals (magnesium, phosphorus, and potassium) and microminerals (selenium and molybdenum) significantly differed between all producers ($p<0.001$). Macrominerals (sodium, phosphorus, and potassium) were significantly higher in the fall compared to spring ($p<0.001$), while microminerals (zinc and selenium) were significantly higher in the spring compared to fall ($p<0.05$). Although beef from producer 2 was fed with the same finishing diet in fall and spring, sodium, magnesium, and zinc contents in the beef sample were higher in fall compared to spring ($p<0.001$). These results suggest seasonal variations in macro and micro nutrients in grass-finished beef.

SEASONAL VARIATIONS IN OMEGA-3 AND OMEGA-6 FATTY ACIDS IN GRASS-FINISHED BEEF
Selin Sergin
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 5
Mentor(s): Jenifer Fenton

Over the past decade, consumer interest has increased in grass-finished beef (GFB), evidenced by retail sales reaching $272 million in 2016. While it is known that GFB contains higher omega-3 fatty acid levels compared to grain-fed beef, variations in fatty acid levels of GFB by producers nationwide, and by seasons, is poorly documented. In order to better understand the nutritional variability in GFB marketed to consumers, producers throughout the US were asked to send samples from cattle finished in spring and fall. Fatty acid content of the samples from 4 producers were quantified using the microwave method and FAMES were analyzed with GC-MS. Total omega-3 fatty acids significantly differed between all producers ($p<0.001$), and were highest in producer 8 (15.4), followed by producers 2, 5, and 4. Producers 2 and 4 had varying levels of total fatty acids in fall beef samples compared to spring beef ($p<0.001$). Although cattle from producer 2 were fed the same reported finishing diet in fall and spring, total omega-3, omega-6, and polyunsaturated fatty acids (PUFA) were higher in spring compared to fall beef samples ($p<0.001$). These results suggest that there are seasonal variations in omega-3 and omega-6 fatty acids in grass-finished beef.

UNDERSTANDING PEOPLE'S WILLINGNESS TO FUND INITIATIVES TO IMPROVE WATER QUALITY
Keegan Gendron
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 6
Mentor(s): Frank Lupi

Water quality in Michigan, as it relates to recreation and aquatic wildlife, is of great environmental and economic importance. Impactful changes in water quality come at a financial cost, so improved policy requires understanding voters' decisions, including the justifications for those decisions. This research collected data to understand people's willingness to fund initiatives to improve water quality. An online survey was conducted via Qualtrics software, from October 2018 - January 2019. The sample was Michigan adults from a Qualtrics online panel, which resulted in 2,500 respondents. Survey responses provided data on each individual's understanding of water quality and willingness to pay for water quality improvements. The primary focus of this research is on the respondent's reasoning behind a for/against vote on a proposed one-time tax increase to fund water quality improvements. This involved a qualitative assessment of survey comments explaining each person's vote for/against paying for the improvements, along with statistical analyses on the results of the assessment. These analyses will allow for better understanding of Michigan residents' concern for water quality improvement and will provide crucial insights about future policy changes related to water quality, as well as their impact on the Michigan economy and aquatic ecosystems.

VAX1 HETEROZYOTE MICE HAVE ABNORMAL CIRCADIAN RHYTHMS WHICH CONTRIBUTE TO THEIR POOR FERTILITY
Tulasi Talluri
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 7
Mentor(s): Hanne Hoffmann

Genetic factors' contribution to infertility remains poorly understood. To develop novel infertility treatments, a better understanding of genes controlling reproduction is necessary. Fertility is regulated by the reproductive axis which encompasses the brain, pituitary gland, and gonads. The primary drivers of the reproductive axis are gonadotropin releasing hormone (GnRH) neurons which release GnRH at the median eminence. Our previous work identified the developmental transcription factor, Vax1 (Ventral anterior homeobox 1) to be crucial for GnRH neuron development. Because Vax1 knock-out (both alleles deleted) is neonatal lethal, we analyzed fertility in Vax1 heterozygotes, and found surprisingly strong subfertility which could not entirely be explained by the reduction of GnRH neurons. Vax1 is highly expressed in the hypothalamic area controlling circadian rhythms called the suprachiasmatic nucleus (SCN). The SCN neuropeptide vasoactive intestinal peptide (VIP) is required for female fertility and normal circadian wheel-running activity. We hypothesized that Vax1 in the SCN is required for normal SCN function. We placed female Vax1 heterozygote mice in running wheels and found that they have abnormal wheel-running activity in constant darkness showing impaired SCN function. To determine how the abnormal SCN function arose we did immunohistochemistry for VIP. Our preliminary data show a reduction in VIP expression, along with normal SCN morphology established using hematoxylin and eosin staining. We conclude that Vax1 heterozygous females have a reduction in VIP neuropeptide in the SCN causing abnormal circadian rhythms, contributing to their poor fertility. This study identifies Vax1 mutations to be a potential contributor to human sub-fertility.

INCREASING ANTIBIOTIC RESISTANCE: ISOLATION OF ANTIBIOTIC-RESISTANT GENES FROM CANADIAN GEESE FECAL SAMPLES
Erica Preblich
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 91
Mentor(s): Steven Poorna Viswanathan

Antibiotic-Resistant (AR) organisms are becoming increasingly problematic due to their transmission through Waterfowl, specifically Canadian Geese (*Branta canadensis*). In particular, *Escherichia coli* and *Pseudomonas putida* are bacterial organisms whose genomes are becoming increasingly antibiotic-resistant. This study hypothesizes that if Canadian Geese are excreting AR bacteria in their feces, then there will be in an increase in AR bacterial infections in humans therefore posing a threat to public health. In this study, fecal and fecal contaminated soil samples were taken from the Okemos pond, located in Okemos, Michigan. The samples were grown on LB plates and then tested against multiple antibiotics in order to test for resistance. Specific AR genes were isolated and amplified into a TOPO vector,

allowing for quantification of AR bacterial cells in the original sample. From the qPCR results for the bacterium *E. coli* it was calculated that 0.37% of the fecal sample contained the blaTEM antibiotic resistant gene and 1% of the sample contained the tet(W) antibiotic resistant gene. On average, Canadian Geese defecate around 1.5 pounds of fecal matter per day. The results found in this study reveal that just a small amount of fecal matter contamination can cause a public health hazard risk. If someone with a skin abrasion or wound comes in contact with these feces or fecally contaminated soil, there is a major concern of not only infection but the possibility of being unable to treat the infection due to increasing antibiotic resistance.

DAIRY CATTLE AND PREVENTATIVE HEALTH CONSIDERATIONS
Eliza Turnage, Hannah Snyder
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 92
Mentor(s): Steven Safferman

Antibiotic overuse has become a major issue as demonstrated in recent scientific headlines. Antibiotic overuse can cause antibiotic resistance and alter ecosystems. More than 70 percent of medically important antibiotics in the United States are sold for livestock use and a large portion of those are used for dairy cattle. Some of those antibiotics go through an animal and are excreted unchanged and end up in runoff going toward local bodies of water. Changing conditions for cattle care and increasing overall welfare to reduce the use of preventative antibiotics seems like the obvious answer and has been a success in European countries such as Sweden. There have also been new studies that have looked at emerging medical alternatives that promote disease prevention. This project entails conducting a literature review on alternative methods of disease prevention in the dairy cattle industry taking into account environmental, economic, social, practical, and ethical considerations to recommend the best current available practices to promote human, animal, and ecosystem health.

ASSOCIATIONAL EFFECTS OF CHEMICAL TRAITS AMONG TOMATO PLANT NEIGHBORS SHAPES THE ARTHROPOD COMMUNITY
Megan Frick
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 93
Mentor(s): Andrea Glassmire, William Wetzel

Commercial agriculture is crucial for obtaining large crop yields but, as a consequence, large monocultures attract insect pests. An alternative way to reduce insect pests but keep crop yields large is intra-crop diversity, which mixes plant varieties and introduces trait diversity. We tested the Associational Effects Hypothesis, positing that plant neighbors influence community interactions of the focal plant. Specifically, whether neighboring chemical traits reduce pests or promote beneficial predators. We manipulated chemical traits of tomato varieties along the different axes of overall chemistry (i.e, alkaloids, terpenes, and acylsugars) within a plant neighborhood and quantified the number of insect visitors to each neighborhood in a natural field setting. Sticky traps were placed above the focal commercial tomato plant located in the center of the plant neighborhood and surrounded by three other varieties. Sticky traps were collected after 48 hours. The insects on each sticky trap were identified to Order and Family with a total of 5,219 individuals have been identified. Among the 126 plots, 86 plots had at least one cell with individuals absent. Hymenopterans and Hemipterans are most represented; specifically, the superfamily Chalcidoidea (Hymenoptera) and the family Cicadellidae (Hemiptera) are the most common, while Odonatans and Orthopterans are the least represented orders. Preliminary results show differences between plots based upon chemical trait diversity and density of neighboring plants. Isolating beneficial chemical traits and facilitating this information to plant breeders can motivate pest management to use sustainable methods.

ALARM RESPONSIVENESS TO HETEROSPECIFIC CALLS IN THOMSON'S GAZELLES (GAZELLA THOMSONI)
Kelly Leary, Christina Degregory
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 94
Mentor(s): Zachary Laubach, Lily Johnson-Ulrich, Tracy Montgomery

Eavesdropping, or attention and response to vocalizations of other species, is a learned behavior that is hypothesized to improve fitness. For example, prey species that alert to heterospecific alarm calls have a greater chance of survival through early detection of potential predators. We hypothesized that rather than responding equally to the alarm calls of all sympatric species, individuals should respond differently to alarm calls of different species. For example, an individual species should respond more strongly to alarm calls of larger species, since predators of larger species are greater threats than predators of smaller species. To test our hypothesis, we performed playback experiments on Thomson's gazelles (*Gazella thomsoni*) in the Maasai Mara National Reserve, Kenya. We studied 18 mixed-species groups of Thomson's gazelles and other sympatric ungulates of varying sizes, either topi (*Damaliscus lunatus*), impala (*Aepyceros melampus*), or Grant's gazelles (*Gazella granti*). For each group, we performed a playback experiment on the Thomson's gazelles using the alarm call of the "other" ungulate species present, and recorded the vigilance behavior of the Thomson's gazelles. We predicted that Thomson's gazelles would have a stronger response to alarm calls from larger ungulates (i.e., topi) because larger predators are a greater threat to Thomson's gazelles and only larger predators are able to prey on topis. Our results support our hypothesis: Thomson's gazelles who heard the topi alarm call playback exhibited the longest duration of vigilance behavior as compared to Thomson's gazelles who heard the alarm calls of the other smaller species (impala, Grant's gazelle).

MANIPULATING CHEMICAL TRAIT DIVERSITY IN TOMATO PLANTS AS AN EFFECTIVE PREDICTOR OF PREDATOR ATTACK RATES
Anna Jullie
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 95
Mentor(s): William Wetzel, Andrea Glassmire

Insect pests are a major problem to agricultural crops. A sustainable pest management strategy is to increase crop diversity by planting varieties of the same crop that vary in their chemical traits, however this has not been rigorously tested in agriculture. We tested the intra-crop chemical diversity hypothesis, positing that patches with high chemical diversity compared to monocultures of low chemical diversity will have more arthropod predator attacks because chemical diversity attracts a wide variety of predators to the area. We manipulated the chemical defense traits of tomato varieties by planting monocultures of a single variety compared to polycultures consisting of mixtures of chemical traits. Using a novel method, we assessed how attractive plant chemical trait diversity was to the predator community using clay caterpillars. Regurgitant of the specialist tobacco hornworm, Manduca sexta, was painted on half of the clay caterpillars to induce the cues released by plants when caterpillar saliva activates with damaged plant tissue. Clay caterpillars without regurgitant served as the control. Preliminary results suggest there are differences in arthropod predator attacks depending on the chemical traits of the plant community. Understanding which chemical traits attract predators will enhance biocontrol management.

ASSESSMENT OF MICRORNA ABUNDANCE THROUGHOUT FETAL AND POSTNATAL STAGES OF PIG SKELETAL MUSCLE DEVELOPMENT
Laura Ford
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 96
Mentor(s): Catherine Ernst

MicroRNAs (miRNAs) are a class of noncoding RNAs known to post-transcriptionally regulate gene expression through binding with target mRNAs, ultimately affecting numerous biological processes and phenotypes. Several miRNAs have been shown to play important roles in skeletal muscle development; however, lack of comprehensive assessment of miRNA expression in developing muscle limits understanding of their role in this complex process. A previous small-RNA sequencing study in fetal pig *longissimus dorsi* (LD) muscle identified dozens of differentially expressed miRNAs between key stages of myogenesis, but their expression at later stages of pre- and postnatal muscle hypertrophy has not been studied. The objective of this study was to validate the abundance of eight miRNAs (miR-93-5p, miR-208b-3p,

miR-133a-5p, miR-615-3p, miR-338-3p, miR-33a-5p, and miR-378a-3p) in pig LD skeletal muscle at 41 and 70 days gestation (dg) and assess abundance at later stages of muscle development (105dg, 1wk and 5wk postnatal). Total RNA was extracted from LD samples of male and female fetuses (n?3 per sex per stage) obtained from YorkshirexLandrace gilts. miRNA abundance at each stage was determined using real-time RT-qPCR assays with TaqMan chemistry. Our results confirmed patterns of expression previously observed from 41dg to 70dg; additionally, a significant age effect was found across all samples (1.34E-13?p?1.885E-3). Four miRNAs (miR-93-5p, miR-615-3p, miR-196a-5p, miR-33a-5p) decreased in abundance with increasing age, while three (miR-133a-5p, miR-338-3p, miR-378a-3p) increased in abundance. miR-208b-3p showed a dynamic abundance pattern with increasing age. Observed dynamic and miRNA-specific patterns across tested stages suggest important roles for these miRNAs during skeletal muscle development.

EXAMINING THE EFFECT OF TYPICAL AGRICULTURAL MEDICATIONS IN AN AQUATIC ENVIRONMENT
Caleb Wendt, Hannah Snyder, Eliza Turnage, Sydney Janssen, Lauren Kaltz
Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 181
Mentor(s): Steve Marquie, Steven Safferman, Georgia Peterson

This research presentation will examine the effect of a specific probiotic and antibiotic in an aquatic environment modeling runoff from agricultural areas. The antibiotic that will be used is doxycycline, while the probiotic is *lactobacillus lactis*, both likely used in an agricultural setting. This research is expected to be carried out in five separate twenty-gallon tanks each containing different aquatic plant species. Utilizing one control tank and two tanks containing different concentrations of the antibiotic or the probiotic, we hope to evaluate the effect on aquatic life in terms of overall health and mortality rate relative to our control group. Water quality will also be measured.

HOW DOES SOCIAL ORGANIZATION IN IMPALAS IMPACT HABITAT UTILIZATION?
Ashley Brzozowski, Andrew Nowicki, Shannon Leary
Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 182
Mentor(s): Lily Johnson-Ulrich, Tracy Montgomery

Many ungulate species have social structures organized into harems and bachelor herds. Females in the harem are often pregnant or lactating and therefore have different water or nutritional requirements, some species also have a female hierarchical structure where females determine herd movements (e.g. zebras). This structure may allow lactating females to guide their herds to more optimal habitats. Our study population included 4 groups of impala bachelor herds and 6 groups of impala harem herds within the Maasai Mara National Reserve, Kenya. The goal of our study was to analyze how group organization of impalas affects the choice of habitat. As shorter grasses are known to have higher nutritional values, we hypothesized that impala harem herds would utilize higher quality habitats to care for their offspring unlike bachelor herds. We observed harem and bachelor herds of impala and categorized their habitat as having short, medium, or tall grass. Herd behavior was recorded under zero-one scan sampling for 10 minutes in two-minute intervals. It was noted whether herds were observed grazing or not grazing. Results indicated that both bachelor and harem herds utilize short grass habitat and no significant differences were found between groups regarding their preferences in grass length. Although the results were not statistically significant these findings may reflect limitations in our ability to detect different habitat preferences as there are many other factors that influence habitat choice in ungulates, such as interspecific competition, or impala harems and bachelor herds do not, in fact, have different nutritional needs.

THE LINGERING EFFECT OF HUMAN DISTURBANCE ON IMPALA ACTIVITY PATTERNS
Qadir Muhammad, Ava Miller, Shannon Leary
Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 183
Mentor(s): Lily Johnson-Ulrich, Tracy Montgomery

Human-wildlife conflict is a major challenge of wildlife conservation worldwide. In parts of the Maasai Mara National Reserve, thousands of cattle were grazed in the park from 2013 - October 2017, when cattle were abruptly barred from the park. The aim of our study was to compare the residual effects of cattle grazing on populations of a common ungulate species: Impala (Aepyceros Melampus). We studied Impala groups on two sides of the reserve: near the park border in Narok County, where illegal cattle grazing has historically been very high, and near the center of the Mara

Triangle, a relatively pristine part of the reserve. We hypothesized that historic high levels of cattle grazing would have a lingering effect on the behavior of Impala. We predicted that groups of Impala would react differently when they heard the sounds of Maasai whistles, yells, and cowbells. To collect our data, we performed playback experiments and used scan sampling to quantify group behavior before and after the playback of human and cattle noises. We then used two-sample t-tests to compare behavior before and after the playback and between the two sides of the park. After hearing the playback, Impala groups in Narok County, spent more time alert and active, and less time grazing, than groups in the Mara Triangle. We then concluded that our data supported our hypothesis, that there is a lasting effect of high levels of cattle grazing on Impala Behavior in Narok county.

EFFECT OF DELAYING PROVISION OF LIQUID WHEY TO NURSERY PIGS
Nate Vankley
Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 184
Mentor(s): Dale Rozeboom

Liquid whey (LW) is a nutritious alternative food for nursery pigs. Previous research by our undergraduate research group in Animal Science has shown that weaned pigs readily consume LW when it is provided in a nipple drinker or wet-dry feeding system. We observed that if LW is provided ad libitum immediately after weaning, piglets retained abnormal nursing-bout behavior, experienced incidental scouring, and grew slightly slower. The objective of this study was to see if delaying the provision of LW to pigs following weaning would avoid these undesirable effects. This study was done at the Michigan State University Swine Farm. Seventy-two weaned pigs were included in this study and randomly assigned to 9 different pens (3 per treatment). Treatments included: 1) Control, normal feed and water provision for 6 weeks post-weaning; 2) Control plus LW supplemented through a wet-dry feeder during weeks 3 to 6; and 3) Control plus LW supplemented through a wet-dry feeder during weeks 5 to 6. Pigs given LW consumed less dry feed than Control pigs during the week's LW was fed. Treatment 2 pigs consumed more LW in week 6 than did treatment 3 pigs (3.16 and 2.40 kg/d, respectively) and grew more slowly than treatment 3 pigs during that week (0.82 and 0.92 kg/d, respectively). In conclusion, pigs provided LW 2 weeks after weaning retained more abnormal nursing-bout behavior and incidental scouring; and grew slightly slower than pigs introduced to LW 1 month after weaning.

THE RELATIONSHIP BETWEEN PRODUCTION TRAITS AND PLAY BEHAVIOR IN GROUP-HOUSED PIGS
Susan Hoffman
Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 185
Mentor(s): Janice Siegford

The presence of play is often used as an indicator of animal welfare, particularly for domestic pigs, Sus scrofa. In group-housing systems, pigs have ample opportunity to play, but little is known about how play behavior may influence pig production. The objective of this research was to explore the relationship between play behavior and the production traits of growth rate, backfat thickness, and loin muscle area in group-housed pigs. Castrated male pigs (n=62) were observed for duration of play behavior(s) immediately after being mixed into a new social group at 10 wk of age (approximately 23 kg) and again 3 wk after mixing. Prior to slaughter, a final weight was collected and used to calculate growth rate (lb/day) for the pigs during the grow-finish stage. Backfat thickness (cm) and loin muscle area (cm2) were measured using ultrasound. The mean and standard error (in parenthesis) for the variables were: play at mix 2.19 s (0.68 s); play at 3 wk after mix 9.63 s (1.77 s); growth rate 1.89 lb/day (0.02 lb/day); backfat thickness 1.97 cm (0.04 cm); loin muscle area 45.15 cm2(0.73 cm2). Spearman rank correlations were used to compare play after mixing and 3 weeks later to production traits. Our results revealed no relationship between play behavior and any production trait (P> 0.161). The absence of a relationship between play and productivity in group-housed pigs can be advantageous because play behavior can be encouraged and even selected for to improve welfare without affecting production traits.

EFFECT OF TRIBUTYLTIN ON ADIPOCYTE SECRETOME.
Madison White
Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 186
Mentor(s): Almudena Veiga-Lopez

Endocrine disrupting chemicals (EDCs) are chemicals that can interfere with the cellular endocrine responses. One of such EDCs is tributyltin (TBT), a chemical used in marine antifouling paint and fungicides. Preliminary data in the laboratory have shown that TBT exposure can enhance preadipocyte's (adipocyte precursors) cell differentiation and lipid droplet accumulation. In Dr. Veiga-Lopez's laboratory, I will be studying the effect of TBT on adipocyte secretion. The long-term goal of this project is to understand if EDCs can program adipose tissue-mediated insulin resistance. During this Spring semester, I will first be investigating if exposure to TBT alters adipocyte endocrine secretory ability. Cells used in this study will be from mice. The preadipocytes will be treated with different concentrations of TBT, and these doses will be based on current human exposures to this chemical. Preadipocytes will be induced to differentiate into mature adipocytes for 10 days. Mature adipocytes will be stained with fluorescent bodipy stain and DAPI counterstain to evaluate lipid droplet content. Mature adipocytes also secrete various cytokines, adipokines, and other hormones. The conditioned media of these mature adipocytes will be collected to evaluate if the cytokine profile is altered. Evaluation of cytokine secretion will be performed using a cytokine immune-based array. We expect that TBT exposure will alter the normal composition of adipocyte secretion. If our hypothesis holds true, and TBT can lead to a disruption in the adipocyte secretome, future experiments will evaluate if the EDC-induced alteration in adipokine secretion can alter insulin responsiveness in skeletal muscle cells.

POTENTIAL DISTRIBUTION OF SPOTTED LANTERNFLY (LYCORMA DELICATULA) UNDER CURRENT AND FUTURE CLIMATE CONDITIONS
Anne Johnson
Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 261
Mentor(s): Rufus Isaacs, Philip Fanning

The spotted lanternfly, *Lycorma delicatula* (White, 1845), is an invasive insect first found in the United States in 2014, in Berks County, Pennsylvania. It has now spread throughout much of southeast Pennsylvania, as well as having confirmed sightings in other adjacent states. This species has the potential to become a major pest in the Midwest region due to its wide host plant range, which includes many economically important ornamental, fruit, and hardwood trees as well as grapevines and hops. Especially concerning is the apparent ability of *L. delicatula* eggs to survive at temperatures lower than previously thought, having significant implications for its potential spread. Knowing the potential distribution of *L. delicatula* in the United States would help states and agencies prepare for the possible invasion of this pest; perhaps reducing the damage it causes. The potential range of *L. delicatula* can be predicted with climate envelope modeling using information on its current distribution in its home range and in the United States, and the climatic variables of locations that the insect is currently found in. In this study, I mapped the potential distribution of *L. delicatula* in the Midwest region using typical weather conditions and conditions expected under a future climate change scenario.

DEVELOPMENT OF A PCR ASSAY FOR SPECIES DIAGNOSTICS IN THE RHAGOLETIS POMONELLA (DIPTERA: TEPHRITIDAE) SPECIES GROUP
Wirat Pipattanamaitree, Phillip Brzezinski
Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 262
Mentor(s): James Smith

The genus Rhagoletis contains multiple species of true fruit flies that are hard to distinguish morphologically from one another. This leads to difficulties with regards to apple orchards where a species other than R. pomonella (apple maggot) could be mis-identified as R. pomonella, leading to owners having to quarantine their orchards and lose money in the process. Previous work we did with other classmates revealed that there might be a discordance in the relationships of three fly species (R. pomonella, R. mendax (blueberry maggot) and R. zephyria (snowberry maggot)) based on mitochondrial DNA sequences and the relationships as revealed by 28S rRNA gene sequences. This implies that the nuclear and mitochondrial genomes in these three species may have different evolutionary histories. The goal of our current research is to find out if this apparent "cytonuclear" discordance exists beyond the small sample we

analyzed previously. Towards that end, we are developing a PCR-based test that will allow us to assign mitochondrial haplotypes to individual flies and then compare that with their nuclear genotypes as determined by sequencing a part of the 28S rRNA gene. Here we report on the design of specific mtDNA primers and their use for PCR-amplification of mitochondrial gene regions from R. pomonella, R. mendax, and R. zephyria flies from a number of eastern US populations.

EFFECTS OF ADDED ENRICHMENT ON DAIRY CALF GROWTH AND BEHAVIOR
Kaylee Montney, Brooke Zader
Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 263
Mentor(s): Jason Knott, Nathalie Trottier

After birth, dairy farmers move calves to individual hutches to protect calf health before transitioning to group housing. While keeping a calf in an individual hutch prevents the spread of bacteria and allows the immune system to develop, this period can be stressful as cattle are natural herd animals. The objectives of this pilot study were to 1) teach Animal Science Undergraduate Research Student Association members behavioral research methods; 2) test the hypothesis that providing enrichment to calves housed in hutches lowers the stress response and improves overall health. At the MSU Dairy Cattle Teaching and Research Center, six heifer calves were randomly assigned to one of two enrichment treatments or a control group with no added enrichment. The enrichment consisted of a jolly ball or a brush. The study was conducted from mid-October to mid-November 2018. An initial salivary sample was collected from each calf on the first day of placement in a hutch. Calves were observed for a minimum of one hour a day. Behavioral observations were recorded according to an ethogram from a distance outside the hutches to ensure no interaction with the calves. Health scores were recorded daily. Calf weights were taken at birth and every week after. A final saliva sample was taken at the time of dehorning. Final analysis of data and salivary cortisol are undergoing and will be presented at the forum. Results of this pilot study will provide information on whether added enrichment to calf housing is beneficial for the dairy industry.

EFFECTS OF GENOTYPE BY DIET INTERACTION ON QUANTITATIVE TRAITS IN DROSOPHILA MELANOGASTER
Danyue Kang
Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 264
Mentor(s): Wen Huang

Genotype by environment interaction can contribute significantly to phenotypic variation in genetically diverse populations. For example, diet is an important environmental factor that can induce plastic responses for many phenotypes in flies. However, the extent to which the dietary responses depend on the genetic backgrounds of the individuals, a form of genotype by environment interaction, and its genetic basis, remain less understood. Such genotype by diet interaction shares analogy with observations in the human population where the risks of metabolic disorders conferred by different diets apparently change among ethnic groups and among individuals. However, the effects of diets and genetic backgrounds are difficult to separate in humans. The fly model provides a unique design in which genotypes can be replicated and subject to different dietary treatments, such that the effects of genotypes, diets, and genotype by diet interaction can be disentangled. In this study, we used 10 genetically diverse inbred strains from the fully sequenced and deeply phenotyped *Drosophila melanogaster* Genetic Reference Panel (DGRP), to quantify the effects of genotype by diet (standard, high sugar, high protein) interaction on several quantitative traits, including fertility, body weight, resistance to starvation, and developmental time. We found statistically significant effects of genotype by diet interaction that contributed to the majority of quantitative trait variation. By further profiling the expression of genes in embryos, brain, and fat body, this study will provide useful insights into the contribution of genotype by diet interaction to quantitative trait variation and the underlying variation in gene expression.

HOW SIMILAR ARE THE HONEY BEE COLLECTED POLLEN COMMUNITIES AS DETERMINED BY MOLECULAR VERSUS MICROSCOPIC IDENTIFICATION?
Abigail Seeger
Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 265
Mentor(s): Rufus Isaacs

Honey bee populations have been in decline over the past several decades, caused in part by insufficient access to nutritional forage (flowers). Identification of pollen collected from honey bees is one method that can determine quality of available forage, and molecular analysis is a useful tool for identification. However, previous research has shown that some sequence reads are overamplified during molecular analysis, which could distort the results. The purpose for our research was to investigate the accuracy of molecular analysis for pollen identification by comparing the results with visual identification. To do so, we compared the type and amount of pollen collected from honey bee hives in southwest Michigan by both methods: molecular, (conducted by the Northern Prairie Wildlife Research center) and microscopic identification. In this presentation, I will discuss the concordance of molecular analysis for pollen identification and address differences in communities detected by each method and the strengths and weakness of each.

SCREENING SOYBEAN AND CORN ROOT COLONIZATION BY A FUSARIUM VIRGULIFORME NATURAL Population
Judy Chen
Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 266
Mentor(s): Brad Day, Amy Baetsen

Soybean sudden death syndrome is caused by the ascomycete *Fusarium virguliforme* (*Fv*) in the United States. Previous screenings of *Fv* isolates have revealed differences in aggressiveness on soybean, however it remains to be explored if isolate aggressiveness persists on alternate hosts. Specifically, we dissected if corn, an asymptomatic host for *Fv* and commonly grown in rotation with soybean, would be colonized to a similar extent as soybean by natural populations of *Fv*. In 2016, isolates were collected from soybean roots in a field naturally infested with *Fv* in Decatur, MI and nine were applied to the study. A growth pouch based assay was applied to germinated soybean and corn seedlings, either individually inoculated with *Fv* macroconidia from nine field isolates and *Fv isolate* Mont-1, or mock inoculated with water. After 14 days post inoculation, *in-planta* growth was determined using trypan blue staining of roots. Additionally, root samples were collected for DNA extraction, and real time qPCR assay assessed *Fv* DNA quantities. Over the two week interval, symptoms developed on the soybean roots but not on corn roots. However, staining revealed *Fv* mycelia growth upon both the soybean and corn roots. The first biological repeat showed a trend of 100 fold reduction of corn to soybean *Fv* DNA quantities, but different isolate colonization levels were detected within each plant type. The conclusions from ongoing experiments will uncover if *Fv* has differing patterns of colonization that is consistent in both corn and soybean roots from a natural population.

EFFECTS OF CHRONIC EXPOSURE OF JAPANESE QUAIL (COTURNIX JAPONICA) TO AQUEOUS FILM FORMING FOAM (AFFF)
Megan Crawford
Agriculture and Animal Science, Oral Presentation
Section: 5, 1:30 PM, Lake Superior Room
Presentation Number: 631
Mentor(s): Steven Bursian, Jane Link

Aqueous film forming foam (AFFF) was used by the Department of Defense for over 40 years for fire-fighting and emergency response activities. This has resulted in ground and surface water, soil, biota and wildlife near relevant military bases being contaminated with perfluorooctane sulfonate (PFOS), perflurooctanoic acid (PFOA) and other poly- and perfluoroalkyl substances (PFASs). In order to develop an avian toxicity reference value for these chemicals, the effects of a 3M AFFF formulation containing primarily PFOS with a lesser concentration of PFOA on egg production, embryo development, hatchability and chick survivability and growth were determined in Japanese quail (*Coturnix japonica*). Hatchling Japanese quail were fed 6 different dietary concentrations of AFFF for 140 days. At 4 weeks of age, 16 male/female pairs were assigned to each of the 6 treatment groups. At 10 weeks of age, the females started laying eggs. Eggs were collected daily, set weekly and incubated for 18 days for the following 10 weeks. Hatchlings were fed clean feed for 2 weeks and then euthanized and sampled for blood and liver. Unhatched eggs were opened to determine stage of development. Results indicated that dietary exposure of Japanese quail to 3M AFFF had an adverse

effect on egg production, hatchability, chick survivability, and chick weight. Based on chick survivability the presence of AFFF in the environment could pose a threat to avian wildlife at a daily dose of 0.58 mg PFOS/kg body weight/day.

HOW AQUARIUM FISH COULD SAVE THE RAINFOREST: GLOBAL PRESSURES AND THE VIABILITY OF BRAZILIAN ORNAMENTAL FISHERIES
Jake Wier
Agriculture and Animal Science, Oral Presentation
Section: 5, 1:45 PM, Lake Superior Room
Presentation Number: 632
Mentor(s): Daniel Kramer

The growing popularity of tropical fish for home aquariums in the mid-twentieth century created a booming ornamental fishery in the Brazilian Amazon. However, a multitude of global pressures have caused this fishery to decline over the last few decades. This decline is concerning, because ornamental fishermen are shifting their livelihoods to less sustainable industries like agriculture, logging, and mining. This presentation reviews existing literature and synthesizes previously identified reasons for the decline. In addition, this presentation discusses the implications of increased aquaculture, location and supply chain inefficiencies, consumer preference, and Brazil's regulatory setting. While the culmination of these factors belies the identification of simple solutions, we conclude that more effective consumer marketing, local economic incentives, regulatory reform, and transportation investment can revive Brazil's ornamental fisheries and, in turn, avoid further detriment to Brazil's rainforests and biodiversity.

COMPARISON OF TOTAL RADIOGRAPHIC BONE AALUMINUM EQUIVALENCES (RBAE) FROM DIGITAL RADIOGRAPHS TO BONE ASH CONTENT OF THE EQUINE THIRD METACARPAL
Brittney Emmert
Agriculture and Animal Science, Oral Presentation
Section: 5, 2:00 PM, Lake Superior Room
Presentation Number: 633
Mentor(s): Brian Nielsen, Cara Robison

Previously, estimating bone mineral content (BMC) in horses with RBAE used film radiographs. As digital radiographs are now common, post-image processing distorts RBAE values, making it ideal to use unprocessed images. Results from digital radiographs have not been compared to actual BMC. This study compared bone measurements using calipers to imaging software on radiographs and compared RBAE values from raw radiographs to BMC from bone ash. Dorsal-palmar (DP) and lateral-medial (LM) digital radiographs were taken of 6 MCIII from equine cadavers with an Al stepwedge as part of an ongoing project. A cross-section from the midpoint of the bone was analyzed using imaging software. Total RBAE was measured by taking the intensity*area of the cross-section of bone and expressing it to a known volume of Al calculated from the intensity*area of the stepwedge. A cross-section of each bone corresponding to the area analyzed on the radiograph was excised. Cortical thicknesses and DP/LM inner and outer diameters were measured using calipers on each sample and imaging software on radiographs. Bone samples were ashed, which was then recorded as BMC. All cortex measurements except palmar trended toward being similar ($P<0.09$). LM outer diameter and DP/LM inner diameter were similar ($P<0.01$). DP outer diameter tended to be the same ($P=0.07$). Total RBAE compared to BMC showed a strong correlation ($P<0.01$). These results suggest that using digital radiographs for bone measurements is accurate, confirm the strong relationship between total RBAE and bone ash, and emphasize the need to use unprocessed radiographs for digital analysis.

ALTERATIONS IN THE SKELETAL MUSCLE PROTEOME AND PLASMA THIOLS IN THOROUGHBRED HORSES FED AN ANTIOXIDANT SUPPLEMENT
Marisa Henry
Agriculture and Animal Science, Oral Presentation
Section: 5, 2:15 PM, Lake Superior Room
Presentation Number: 634
Mentor(s): Stephanie Valberg

Reactive oxygen species are generated at high exercise intensities with potential to overwhelm the muscle's antioxidant capacity. Thiols (cysteine, homo-cysteine, and glutathione (GSH)) are important antioxidants in plasma and muscle. This study examined the effect of antioxidants coenzyme Q10 and N-acetyl-cysteine supplementation (AOX) on the skeletal muscle proteome and plasma thiol concentrations. Thoroughbred horses (n=13) in training were placed into a randomized cross-over designed study supplemented with either AOX or placebo for 30 days. On day 30, percutaneous gluteus medius muscle biopsies were obtained and flash frozen in liquid nitrogen. On day 30, blood samples were also

obtained, immediately centrifuged and plasma frozen. Protein was extracted from gluteal muscle and TMT11 proteomic analysis performed. Plasma thiol concentrations were measured by high performance liquid chromatography (HPLC/MS). Out of 387 TMT11 identified proteins, 40 were differentially expressed ($p<0.01$) following AOX including upregulation of 13 mitochondrial proteins, down regulation of 9 glycolytic enzyme proteins and downregulation of a cysteine synthetic enzyme. Concentrations of plasma thiols, particularly GSH, showed large inter-individual variation with 8-fold differences in GSH amongst horses on placebo and 4-fold differences on AOX. Plasma cysteine varied 4-fold and homocysteine 1.4-fold between horses on placebo and 1.8-fold and 2.6-fold on AOX. After log transformation to normalize data, there was no significant change in the plasma thiols on AOX vs placebo. In conclusion, AOX appears to promote oxidative metabolism in skeletal muscle by increasing mitochondrial oxidative enzymes in conjunction with decreasing glycolytic enzymes. Horses have wide individual variation in plasma cysteine-based thiol concentrations.

DOES THE DISTRIBUTION OF INDIVIDUAL AGGRESSIVENESS WITHIN A PEN AT MIXING EFFECT CHRONIC AGGRESSION IN GROUP-HOUSED PIGS?
Lilia Rose
Agriculture and Animal Science, Oral Presentation
Section: 5, 2:30 PM, Lake Superior Room
Presentation Number: 635
Mentor(s): Janice Siegford

Mixing unfamiliar pigs is common in production housing systems. This leads to aggressive interactions between pigs as they establish a social hierarchy. If a stable hierarchy cannot be formed, aggression may persist, decreasing the animals' welfare which, in turn, decreases farm productivity. The relationship between the aggressiveness of individual pigs within a pen with respect to long-term pen stability is not well understood. To examine this relationship, 659 pigs were mixed into groups of familiar and unfamiliar pigs (12-16 pigs/pen). The total duration of agonistic interactions was recorded for each individual during two periods: 24 h after mixing and 3 wk after mixing to observe how well pens stabilized in relation to individual animal aggressiveness. A linear mixed model was fit with effects of replicate, sex, and group size. Effects of skewness, variance, and mean of individual aggressiveness within pen were also included to examine the effect of pen composition on the duration of agonistic behaviors observed 3 wk post mixing. Random effect of pen was also included. Overall, the only significant factor affecting long-term pen stability was sex, with gilts spending less time engaged in aggressive interactions than barrows ($P=0.02$). Pen composition measures of skewness, mean, and variance were not significant ($P>0.05$). This suggests that aggressiveness of individuals within a pen does not influence pigs' ability to establish hierarchies after regrouping. Instead, producers could focus on other factors such as sex, body weight, and stocking density when grouping individuals to reduce levels of aggression long term.

FLAVOBACTERIAL DIVERSITY ASSOCIATED WITH THE EARLY LIFE STAGES OF FARMED AND HATCHERY REARED RAINBOW/STEELHEAD TROUT (ONCORHYNCHUS MYKISS) IN THE US
Amber Johnston
Agriculture and Animal Science, Oral Presentation
Section: 5, 3:00 PM, Lake Superior Room
Presentation Number: 636
Mentor(s): Thomas Loch, Megan Shavalier, Chris Knupp, Mohammed Faisal

Global aquaculture has rapidly expanded, now supplying most fish/shellfish for human consumption. However, infectious diseases generate substantial losses in aquaculture, particularly those caused by flavobacteria (Family Flavobacteriaceae). Alarmingly, some flavobacteria are spread transgenerationally, resist current egg disinfection methods, and kill substantial numbers of farmed trout during early life stages. Compounding the problem are recent reports of previously undescribed fish-associated flavobacteria that also seemingly resist current egg treatments and about which little is known. To devise more efficacious prevention/control strategies, we posit the diversity of flavobacteria associated with trout early life stage disease/mortality must first be fully recognized. Thus, rainbow/steelhead trout (*Oncorhynchus mykiss*) broodstock, reproductive fluids, embryonated eggs, fry, and water from six aquaculture facilities/hatcheries in five US states (ID, MI, MN, OH, PA) were flavobacteriologically analyzed. >480 flavobacterial isolates have been recovered and identified, many of which originated from eggs and fry. 16S rRNA gene sequencing and phylogenetic analyses identified most as *Flavobacterium* spp. Although a subset of identified flavobacteria were well-recognized fish pathogens, the majority were either newly-described flavobacteria linked to trout/salmon disease outbreaks elsewhere in the world or were distinct from all described flavobacteria, likely comprising novel bacterial species. Concerningly, numerous flavobacteria were recovered from eggs after iodophor disinfection, and all tested isolates were not killed by lysozyme, an important antimicrobial component of fish eggs. Results are now guiding flavobacterial virulence experiments, optimization of disinfectant treatments to prevent egg-

associated transmission, and determining effective ultraviolet zap doses to prevent water-borne transmission, ultimately reducing flavobacteria-associated losses in aquaculture facilities nationwide.

ANTHROPOLOGY

SPATIAL ANALYSIS OF CERAMICS AT MORTON VILLAGE
Mike Gates
Anthropology, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 275
Mentor(s): Jodie O'Gorman

Morton Village (11F2) is an archaeological site located in west-central Illinois offering a unique insight into the interactions between the Mississippian and Oneota cultures in the Midcontinent around 1300 - 1400 CE. Fieldwork at the Site has documented houses, facilities, and a wide array of artifacts related to village life including ceramic jars, plates and bowls. Research presented here focuses on plate and bowl vessel forms. These forms are of interest because these are more commonly associated with Mississippian groups, but at this site there is an apparent Oneota adoption of the forms while maintaining their distinctive decorative motifs. These food vessels carried a cultural function, and provide a way of looking at social interactions between Oneota and Mississippian groups presumably linked to eating and serving food within the broader foodways practiced at the site. While much of the archaeological evidence in the Illinois River Valley has indicated violence between the two groups, research at Morton Village has focused on understanding the interaction from the perspective of everyday life at the village and may provide a unique counter-example of cooperation and even cohabitation between the Mississippians and Oneota. My study is the first to look at the spatial context of bowls and plates at Morton Village.

FOOD INSECURITY IN RELATION TO DIFFERENT TYPES OF ANEMIA AMONG BREASTFEEDING WOMEN OF NORTHERN KENYA
Quexteen Saeteurn
Anthropology, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 276
Mentor(s): Masako Fujita, Nerli Paredesruvalcaba

Anemia is a major global public health concern. Nutritional anemia is most common worldwide, often including iron, folate, and vitamin B12 deficiencies. Another type of anemia may arise due to inflammation/infection. Previous research looked at associations between anemia and diet-related characteristics; however, most studies have not differentiated types of anemia. This study examined the association of maternal anemia/different types of anemia with dietary intake, dietary diversity scores, and food insecurity. We hypothesized the following conditions to be associated with anemia: insufficient intake of energy, protein, iron, folate, vitamins A/B12/C; low dietary diversity scores; high food insecurity. Archival data from 241 breastfeeding mothers of northern Kenya collected in 2006 were analyzed. Dietary deficiency and diversity data were based on 24-hour recalls. Food insecurity data (low/high) were based on interviews on food availability/accessibility. Hemoglobin <12 g/dL defined anemia. Anemia with iron deficiency (transferrin receptor >5 mg/L) defined iron-deficiency anemia (IDA). Anemia in absence of iron deficiency defined non-iron deficiency anemia (NIDA). Anemia with inflammation (C-reactive protein >5 mg/L) defined anemia of inflammation (AI). Associations were assessed using t-tests and chi-square tests. Women with anemia/IDA had significantly lower food insecurity scores than their counterparts (p=0.02 and p=0.04, respectively). AI had a similar pattern, although non-significantly. However, NIDA had non-significantly higher food insecurity scores. The results for the associations between anemia/IDA and low food insecurity were unexpected; this presentation will explore the role of sociodemographic variables in these associations. This study highlights the importance of differentiating between anemia types in relation to diet-related characteristics.

DURING DROUGHT IN NORTHERN KENYA, MOTHERS WITH IRON DEFICIENCY ANEMIA WERE YOUNGER, BUT NOT OF LOW SOCIOECONOMIC STATUS
Emma Bignall
Anthropology, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 277
Mentor(s): Masako Fujita, Nerli Paredes Ruvalcaba

Maternal anemia is a prevalent issue globally. There are multiple variables associated with maternal anemia, including socioeconomic status (SES), inter-birth intervals (IBI), maternal age, and time postpartum. Many studies report an association between maternal anemia and low SES. Studies are less conclusive with the direction of associations with IBI, maternal age, and time postpartum. Distinguishing different types of anemia may help clarify these inconsistencies. This study examined: the associations of maternal anemia/types of anemia with SES, IBI, maternal age, and time postpartum. We expected to see the following in association with anemia/types of anemia: low SES, short IBI, older age, and shorter time postpartum. We used archival data from 237 breastfeeding mothers, originally collected in northern Kenyan during 2006 Horn-of-Africa drought. Low hemoglobin (<12 g/dL) and high transferrin receptor (>5 mg/L) defined anemia and iron deficiency, respectively. Associations were examined using t-tests and chi-square tests. Anemic mothers (n=59) were younger compared to non-anemic mothers (n=182; p<0.01). Likewise, mothers with iron deficiency anemia (IDA; n=40) and anemia of infection (AI; n=11) tended to be younger compared to their counterparts (p=0.02 and p=0.07, respectively). Anemic mothers had shorter postpartum time than non-anemic mothers (p=0.02). Mothers with IDA tended to also have shorter postpartum time than their counterparts (p=0.09). There were no significant associations between maternal anemia/types of anemia with SES and IBI. The association between SES/maternal age and maternal anemia may differ depending on the environment. This study highlights the importance of accounting for socio-demographic variables in understanding maternal anemia.

METHODOLOGY AND MORPHOLOGY IN HARRIS LINE ANALYSIS
Ayla Schwartz
Anthropology, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 278
Mentor(s): Gabriel Wrobel

Since their discovery in the early 1920s, Harris lines (otherwise known as growth arrest lines) have been used by anthropologists to assess the timing and intensity of stress incidents on long bones. While Harris lines traditionally have been visualized using x-ray radiography, efforts to use other methods of visualization, including CT scanning and histology, have gained traction in recent years. However, there is still wide disagreement about how best to recognize and quantify Harris lines. Using a sample of long bones from individuals found at the mortuary cave site of Je'reftheel in central Belize, I first assess the population using eight common definitions of what constitutes a Harris line, showing how these produce widely variable results. Referencing the most modern conceptions of what Harris lines are and how they are formed, I propose a series of methodological improvements to ensure consistency in the identification and quantification of Harris lines. Additionally, using CT technology, I track and create a 3-dimensional visualization of Harris lines within the bone. By tracking the configuration of radiopacity, I show how angle and position of x-rays during radiograph collection create privileged viewpoints that further affect Harris line determination and potential research conclusions.

ASSESSING THE USEFULNESS OF FRACTOGRAPHY IN SKELETAL TRAUMA ANALYSIS
Lilli Antonelli
Anthropology, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 279
Mentor(s): Todd Fenton

Forensic Anthropologists study fracture patterns and features of broken bones in order to determine the cause and mechanism of skeletal trauma. A specific issue in trauma analysis is estimating impact direction based on fracture patterns. Recently, Christensen et al. (2018) proposed that fractography could have useful applications in this regard. Fractography is an analytical method used to describe the morphology of a fracture surfaces and determine the cause of failure in various materials, including where a fracture began and ended. The current research investigates the use of fractography to determine the direction of fracture propagation in a sample of experimentally broken bones. Eight human femora were broken in biomechanically controlled 4-point bending experiments. Fracture propagation in these

experiments was filmed using a high-speed camera. Later, fracture surfaces were examined using directed lighting and a low power microscope. The presence and location of four fractographic features described by Christensen et al were assessed and used to estimate propagation direction. The estimated direction of propagation derived from fractographic features was then compared to a video of the actual propagation to determine accuracy. In this presentation I will discuss the fractographic findings on each of the femora, and discuss the forensic implications of these findings for trauma analysis.

PUSHING BABIES OR PUSHING MOTHERS?
Lauren Tofilski, Madeline Dawson, Katie Whalen
Anthropology, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 280
Mentor(s): Lynnette King

We explored the concept that Obstetricians and Gynecologists (OB/GYNs) are pushing women to have cesarean sections or c-sections through analyzed two peer-reviewed journal articles and researching relevant statistical data based on article information. The rate of medically unnecessary c-sections is increasing at an alarming rate. As childbirth becomes more medicalized and the rate of medically unnecessary cesarean sections rises due to financial and time scheduling benefits for OB/GYNs, the maternal and neonatal risks also become more prevalent. Our research question we based our project on is: "What are the effects of the persuasion of Obstetricians and Gynecologists and their push for cesarean sections on the rate of maternal mortality in the United States during the 21st century?" In addition, our main objective is to inform expectant mothers on the push for scheduled cesarean sections. We want to educate women on the potential dangers of a lack of education regarding c-sections and childbirth. Women are suffering from the medicalization of childbirth and the outcomes of an unnecessary cesarean section due to their lack of knowledge about the alternative choices they can make. A large amount of OB/GYNs are taking the power from women and using their medical education as an explanation and an excuse. We will be presenting this information through a poster with both words and pictures.

BIOCHEMISTRY & MOLECULAR BIOLOGY

INVESTIGATION OF FLAVONOID COMPOUND ACCUMULATION IN MATURE SEEDS ACROSS A SET OF DIVERSE MAIZE LINES
Mine Gezgin
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 8
Mentor(s): Erich Grotewold, Addie Thompson

Flavonoids are an extensive group of polyphenolic compounds that are found in almost every plant. These compounds play a role in development, abiotic stress tolerance and defense against pathogens and insect herbivory. They are also considered one of the largest groups of phytonutrients, and demonstrated to have crucial health benefits, such as anti-inflammatory and anti-oxidant properties. The goal of our research is to utilize liquid chromatography-mass spectrometry (LC-MS) to analyze a variety of flavonoids in different maize genotypes across the Wisconsin Diversity Panel and the recent Expired Plant Variety Protection lines. This will enable us to compare flavonoid variety in approximately 800 maize genotypes, and investigate the genetic control of polymerization inhibition of polyphenolic compounds in mature maize kernels for an increased accumulation of bioavailable beneficial flavonoids in maize seeds.

CAN THE COFFEE-RING EFFECT PROVIDE CHROMATOGRAPHIC SEPARATION OF BLOOD PLASMA COMPONENTS?
Najya Zaman
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 9
Mentor(s): Rebecca Lahr

According to the WHO, colorectal cancer is the third most common cancer among men and second among women. Many screening tests available for colorectal cancers are invasive and highly uncomfortable, which is why there is high interest in developing non-invasive, reliable diagnostic tests for patients. Blood plasma is significant because it is easily accessible and contains biochemical markers from tumor cells in circulation. In this work, we are working to harness the

phenomenon known as the "coffee-ring effect" to separate the constituents of blood plasma for a diagnostic tool for cancer. A lab technique called drop-coat deposition Raman (DCDR) is then implemented to identify specific components within the blood plasma. However, the coffee ring effect is overshadowed by the surface capture effect at high solute concentrations. In this presentation, I will address the following question: How high of a solute concentration can be present in blood plasma before the coffee-ring effect is no longer observed? The goal of this work is to identify the solute concentration range for which the coffee-ring effect provides chromatographic separation of biomolecules in blood plasma.

SPECIFIC BINDING TO MAGNETIC NANOPARTICLES AS A METHOD OF MITOCHONDRIAL PURIFICATION AND IMMOBILIZATION
Adam Fillion
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 10
Mentor(s): Julia Busik, Denis Proshlyakov

Mitochondria are the cornerstone of biological energy production, whose dysfunction has been linked to many metabolic diseases, such as diabetes and its complications. We have developed a microfluidics-based platform to study mitochondrial-dependent metabolism by the simultaneous detection of oxygen consumption and electrochemical current, which requires direct access to the organelles for *in situ* assessment of complex-specific activity. Magnetic Nanoparticles (MNP) can be developed into a useful tool to aid in mitochondrial purification and immobilization, allowing for multiple tests to be conducted on a single immobilized sample. We initially tested this by conjugating glucose oxidase (GOx) to the MNPs to act as a mitochondrial substitute in repetitive respiration assays. To test binding efficiency, we tested blocking efficiencies of several agents including proteins (BSA, non-fat dry milk) and carbohydrates (cellulose, heparin, sucrose), each conjugated to the MNPs. To assess viability of mitochondrial immobilization, crude pulldowns were characterized by citrate synthase assays and mirco-respirometry. GOx-conjugated MNPs showed reproducible oxygen uptake rates by a single immobilized sample. Oxygen consumption by a single trapped GOx sample was sensitive to glucose concentration revealing an apparent K_m = 19 mM for glucose at saturating oxygen. Non-specific mitochondrial pulldown by protein- or carbohydrate blocked MNPs was not statistically different of non-blocked (naked) MNPs. What we've learned is that MNPs are a useful tool for immobilization of biological samples in microchannels without the need for specialized preparation procedures.

AMYLOID-BETA PEPTIDE AGGREGATION KINETICS AND ITS ROLE IN DEVELOPMENT OF ALZHEIMER'S DISEASE
Expery Omollo
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 11
Mentor(s): Lisa Lapidus

Previous studies demonstrate that aggregation of Amyloid-beta peptides play a significant role in development of Alzheimer's disease. This study assesses the kinetics of unfolded A-beta (M1-42) peptide using Tryptophan-Cysteine (Trp-Cys) contact quenching. Cysteine and tryptophan are introduced in the peptide sequence through site directed mutagenesis and the peptide is exposed to conditions that favor aggregation to measure the intramolecular diffusion rate. The peptide is expressed in BL21*pLysS E-Coli cells, extracted, purified and lyophilized at volumes containing 1mg of the peptide. Purity is assessed by SDS-PAGE with silver staining and MALDI TOF mass spectrometry before kinetic studies. We hypothesize that the intra-molecular diffusion rate of A-beta (M1-42) is much slower than other forms of A-beta peptides which might be reducing its reconfiguration rate and as a result favoring aggregation. We believe that by adding an aggregation inhibitor, it will speed up reconfiguration which will in turn lower the aggregation propensity.

MODULATION OF COMPLEXES III AND IV BY EXOGENOUS CYTOCHROME C
Kylee Voorhis
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 12
Mentor(s): Denis Proshlyakov, Nathan Frantz

Diabetic Retinopathy (DR) is a major complication associated with diabetes. Complex III dysfunction in mitochondria has been linked with diabetic complications via increasing reactive oxygen species (ROS) production. This ROS production leads to damage of the mitochondrial outer membrane (OM) and subsequent cytochrome *c* release from the

intermembrane space. Current techniques for analyzing mitochondrial activity rely on tracking the oxygen consumption rate (OCR) by complex IV (CmpIV). While it is possible to assess catalytic states of other complexes by measuring OCRs, deciphering the contribution of each complex to the overall respiration is difficult. This work focuses on interrogating activities of complexes III and IV in the ETC of intact and damaged mitochondria using spectroscopy. The OM of mitochondria acts as a barrier preventing the release of endogenous cytochrome *c*. Any OM damage may affect proper mitochondrial function due to loss of cytochrome *c*. The mediator used in this study is exogenous cytochrome *c*, which cannot cross intact OM but can interact with CmpIV in mitoplasts. Three models are used to represent different states of OM intactness, healthy (intact) mitochondria, mitoplasts and detergent-treated mitochondria representing mitochondria with a damaged OM. UV-vis spectroscopy was used to assess the removal of the OM by measuring the rate of oxidation of exogenous cytochrome *c* by CmpIV. Reduction of exogenous cytochrome *c* on an electrode will result in observable changes in oxygen concentration if the OM of the mitochondria is damaged. This demonstrates the ability of mediated electrochemistry to assess intactness of the outer membrane.

ELUCIDATING THE ROLE OF THE GLYCOSPHINGOLIPID GB3 IN THE NEPHROTOXICITY OF CHEMOTHERAPEUTICS
Emily Steffke
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 13
Mentor(s): Robert Pilz

Chemotherapeutics have very toxic effects on the body, in part due to the renal damage they inflict as they are filtered from the bloodstream. It is therefore important to understand the biochemical mechanism of this damage in order to minimize nephrotoxic effects. Previous research has demonstrated that knockout of globotriaosylceramide synthase (Gb3S) alters tubular reabsorption in the proximal tubule of mice, altering the endocytotic uptake process and protecting mice from tubular damage. Therefore, the glycosphingolipid Gb3 may play a key role in the uptake of toxins by human kidney (HK) cells. The aim of my project was to investigate the mechanisms of Gb3-mediated endocytotic uptake and identify other elements functionally linked to Gb3. In order to investigate this, I cultured and maintained a HK cell line that I developed as a Gb3 and sphingosine-1-phosphate lyase (SGPL1) double-knockout using CRISPR methods. I performed the plasmid transfection that allowed for cloning and transformation of the cells, from vector preparation and bacterial transformation to plasmid maxi-prep and transfected single-cell workup. I then processed cells to extract, purify, and quantify DNA, proteins, and various lipid classes, and confirmed knockout validity using PCR, Lipid TLC, and Mass Spectrometry. I then performed various assays on these cells to assess their proteomic interactions and susceptibility to toxins. Overall, elucidation of elements associated with Gb3-mediated toxin uptake will allow for high-throughput screening of drugs that could be co-administration with chemotherapeutics to mitigate renal damage.

EVALUATING BACTERIAL MICROCOMPARTMENT SHELL PROTEINS AS BUILDING BLOCKS FOR SELF-ASSEMBLY OF PREDICTABLE NANO-SCAFFOLDS
Jay Wright
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Ballroom
Presentation Number: 21
Mentor(s): Daniel Ducat

At the nanoscale, cellular pathways are frequently organized upon scaffolding complexes that physically co-localize related components. Natural Nano-scaffolds act to increase pathway flux and fidelity, while also insulating the pathway from unwanted side-reactions and reducing accumulation of pathway intermediates. An outstanding goal for biological engineers is to recapitulate the advantages of natural scaffolds to improve the performance of heterologously installed pathways. Our approach is to use a naturally-occurring protein that self-assembles into defined intracellular structures (bacterial microcompartment shell proteins) as "building blocks" for the assembly of new, user-defined Nano-structures. Here, we show that heterologous expression of these self-assembling building blocks can be used to form macromolecular protein assemblies both in vitro and in vivo. We describe our efforts to attach functionalizing adaptor domains to these protein building blocks in order to allow for programmable protein-protein interactions on the surface of these Nano-scaffolds. Within the context of this broader goal, my project seeks to understand how attaching adaptor domains influences the self-assembly characteristics of shell proteins under a range of different physiological temperatures and pH ranges. By analyzing their ability to continue to form higher order structures, even with the addition of these functional adaptor domains, we aim to characterize a promising biomaterial that could be used as a tool in future bioengineering purposes.

INVESTIGATION OF INTERACTION OF INTRA-MEMBRANE CHLOROPLAST DIVISION PROTEIN ARC6 WITH STROMAL PROTEIN ARC3 VIA YEAST TWO-HYBRID
Shanelle Jackson
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Ballroom
Presentation Number: 22
Mentor(s): Katie Porter, Cheng Chen, Katherine Osteryoung

Chloroplasts, photosynthetic organelles, are a defining and essential feature of Viridiplantae. Their populations within cells are maintained by division, which occurs through the coordination of a number of proteins localized both inside and outside of the chloroplast. Chloroplast division requires the assembly and constriction of a specialized structure, called the Z ring. Two intra-membrane proteins, ARC6 and PARC6, are important for the assembly and regulation of the Z ring in the vascular plant Arabidopsis thaliana. Interestingly, ARC6 is found in all plants while PARC6, thought to be derived from ARC6, appears to be unique to vascular plants. This is of interest because the Arabidopsisdivision protein ARC3, a protein found in most plants that negatively regulates Z-ring assembly, has been shown to be recruited to the division site by PARC6 during division. Specifically, PARC6 interacts with a region of ARC3 called the MORN domain. In ancestral plants that have ARC6 but lack PARC6, we can still observe functional ARC3. PARC6 being the paralog of ARC6 motivated us to ask if ARC6 interacts with ARC3 in the absence of PARC6. We have utilized the Yeast Two-Hybrid system to investigate interactions of ARC3 with ARC6. Our initial findings suggest ARC6 does indeed interact with ARC3 through its MORN domain, similar to PARC6.

MATERIAL CHARACTERIZATION OF PLA
Nicole Mancina
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Ballroom
Presentation Number: 23
Mentor(s): Ramani Narayan

PLA is a biodegradable material that has been used as a bioplastic for water bottles, plastic containers, 3D printing, and medical devices. As a chiral molecule, the polymer and monomer (lactide) possess enantiomers that are non-superimposable mirror images of one another. Specifically, lactide can be an optically active compound ? levorotatory (L) and dextrorotatory (D) ? or an optically inactive meso compound. While L-lactide and D-lactide have similar physical properties (i.e. boiling point, melting point, etc.), their optical rotations are equal but opposite in value since they are enantiomers of one another. Based on the optical rotation of each monomer, one can assess its purity in order to produce high molecular weight neat PLLA/PDLA. Purity of these stereoisomers were analyzed and compared to commercial grade PLA, and different trials were conducted to correlate the optical purity with other material properties. Once the purity (99.9%) of the monomer was confirmed, bulk polymerization was performed to produce high purity PLLA, using Stannous Octoate as the catalyst. A focus on the thermal properties, crystallinity, molecular weight, polarimetry, and optical purity of the resulting polymers was studied using DSC, TGA, and GPC. Different monomer initiator ratios of L-lactide were produced to observe the effect on the molecular weight and thus the thermal properties. Based on this study, we will conclude the next steps to produce stereocomplex PLA using neat PLLA and PDLA.

EXPLORING THE RETROTRANSPOSON LOCI OF THE MOSS PHYSCOMITRELLA PATENS (P. PATENS) FOR ENGINEERING OF DITERPENE METABOLISM
Balindile Motsa
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Ballroom
Presentation Number: 24
Mentor(s): Bjoern Hamberger

Diterpenes are a structurally diverse class of C20 natural products, biosynthesized by plants, animals and fungi with various functions.They play an important role in the growth and development of plants as well as in their defense. Commercially, they are used as flavors, fragrances and pharmaceuticals. However, diterpenes are produced as a mixture of compounds and in minute quantities in plants; extraction from the native source is cumbersome and not economically feasible. It is therefore important to find viable alternatives for production of valuable diterpenes. P. patens can be engineered as a production platform for a range of diterpenes. Its advantage lies in its ability to undergo homologous recombination and its simple diterpenoid biosynthetic pathway that can be easily manipulated. The goal of this project is to investigate the use of retrotransposon (RT) regions as new integration sites for stable integration of diterpene

biosynthetic pathways in the genome of P. patens. A previous study showed that a reporter gene, Yellow Fluorescent Protein (eYFP), can be successfully integrated at the RT region of P. patens. The study found that the fluorescence signal detected in different lines varied greatly in intensity. In this work, a transformed line of P. patens with highest expression of eYFP integrated at the RT region will be used as a background line to incorporate the diterpene biosynthetic genes in that same RT region. We hypothesize that using the same RT integration sites of the highest eYFP fluorescing line will lead to higher expression of diterpene biosynthetic genes and consequently result in higher yield of the diterpene.

ELECTROCHEMICAL MODULATION OF COMPLEXES III AND IV ACTIVITY IN MITOCHONDRIA
Gabrielle Brakoniecki
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Ballroom
Presentation Number: 25
Mentor(s): Denis Proshlyakov, Nathan Frantz

Mitochondrial dysfunction has been associated with a variety of chronic diseases, including autism spectrum disorder, type 2 diabetes, and Alzheimer's. The relationship between mitochondrial dysfunction and diseases is still unclear. Current techniques for the study of mitochondrial activity place emphasis on observing rates of oxygen consumption by complex IV in the electron transport chain (ETC). While current techniques allow for analysis of all complexes in the ETC, deciphering small changes in individual complexes can be difficult, time consuming, and indirect. This project utilizes mediated electrochemistry for the individual assessment of Complexes IV and III in the ETC in intact mitochondria. The outer membrane (OM) of the mitochondria provides a spatial barrier that prevents direct electron transfer between an electrode and the complex of interest, thus a mediator is necessary to carry electrons across the OM. Previous work has shown that electrochemical modulation of mitochondrial respiration is possible. Amperometric data allows for the assessment of activities of individual complexes in intact mitochondria without relying on oxygen concentrations. Results have shown that amperometric data on complex IV correlates with the observed oxygen consumption rates (OCR). The OCR is dependent on mediator concentrations, but it is possible to detect changes in complex IV activity. In addition, we observe changes in complex III activity in the presence of substrates or inhibitors. This work demonstrates the ability to directly investigate complexes IV and III using mediated electrochemistry.

THE EFFECT OF OXIDATIVE STRESS IN MITOCHONDRIA CALCIUM BUFFERING SYSTEM
Hai Truong
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Ballroom
Presentation Number: 26
Mentor(s): Jason Bazil

During myocardial ischemia there is reduction in blood flow to the heart due to partial or complete blockage of the coronary arteries. Paradoxically, when blood flow is reestablished, the majority of tissue damage occurs. This phenomenon is called myocardial ischemia reperfusion injury and involves both dysregulation of calcium handling and reactive oxygen species (ROS). Failing to maintain proper calcium and free radical homeostasis will lead to opening of the mitochondrial permeability transition pore and result in catastrophic energy failure. To understand mitochondrial calcium homeostasis during oxidative stress, isolated cardiac mitochondria from guinea pigs will be exposed to a designated dose of the redox cycler mito-paraquat (MitoPQ) to induce oxidative stress. Changes in mitochondrial calcium handling will be assessed by adding calcium boluses below concentrations that trigger permeability transition in the presence or absence of MitoPQ. Alterations in calcium accumulation will be quantified by simultaneously determining changes in calcium concentration inside and outside the mitochondria using molecular dyes. We expect the addition of higher calcium boluses in mitochondria exposed to the ROS-induced agent will compromise the calcium buffering system. Data from this study will elucidate how mitochondrial calcium handling is detrimentally altered during ischemia/reperfusion injury.

DELETION AND TRUNCATION MUTATIONS TO PROBE FUNCTIONAL DOMAINS OF COMPROMISED HYDROLYSIS OF TRIACYLGLYCEROLS 7 (CHT7) PROTEIN IN CHLAMYDOMONAS REINHARDTII
Chase Lindeboom
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Ballroom
Presentation Number: 27
Mentor(s): Christoph Benning

Under nutrient-limiting conditions, microbes enter a quiescent state where they temporarily cease growth and accumulate high-value carbon compounds such as triacylglycerols (TAG) that can be used in biofuel and feedstock production. Upon nutrient resupply, TAG is degraded to fuel cellular growth; however, previous work has identified a mutant of the unicellular algae, Chlamydomonas reinhardtii that was delayed in regrowth and degradation of TAG upon refeeding of nitrogen (N) to the N deprived cultures. The mutant contained a deletion of a gene termed Compromised Hydrolysis of Triacylglycerols 7 (CHT7). While CHT7 contains a domain known in other species to bind DNA, the mechanism of how it regulates cell life-cycle decision making as well as its functional domain(s) are still largely unknown. To determine what portions of CHT7 are functionally important, we introduced truncation and deletion mutations in the genomic sequence of CHT7 using site-directed mutagenesis PCR. These constructs were introduced into the Chlamydomonas cht7 mutant, and the resulting lines were examined for complementation of the cht7 mutant phenotypes such as delayed degradation of TAG and delayed regrowth during N-resupply following N-deprivation. We found that the truncated mutants demonstrated the C-terminus region of CHT7 is necessary for its activity. Furthermore, the deletion of one of the predicted protein-protein interaction domains resulted in almost complete loss of CHT7 function. Understanding which portions of CHT7 are functionally important could grant us a better understanding of cell life-cycle decision making that could potentially be utilized in engineering algae for the production of biofuels and feeds.

BRANCHING ENZYMES
Raoul Fulgos
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 111
Mentor(s): Hadi Nayebi Gavgani, James Geiger

Starch Branching enzyme (BE) is one of the three enzymes involved in starch biosynthesis. It is responsible for synthesizing the alpha-1,6-glucan branches, remodeling the linear alpha-1,4-glucan polymer to produce amylopectin. Though the chemistry of the active site of branching enzyme is relatively well studied, the origin of the chain length specificity is yet to be understood. The mechanism of branching enzyme involves two steps: (1) An oligosaccharide (donor chain) binds to the enzyme and is cleaved by the action of a nucleophilic aspartate residue to form a covalently-linked enzyme-glucan intermediate. (2) A second oligosaccharide (acceptor chain) then reacts, by nucleophilic attack of one of its alpha-1,6-hydroxyl groups, to form a new alpha-1,6-branch. In order to investigate the action of starch branching enzyme, we obtained a crystal structure of the Rice Branching Enzyme I bound to oligosaccharide (M12). We then studied various mutations of this enzyme for the activity and chain specificity. Here we introduce surface glucan binding sites involved in the action of the enzyme and how they control the activity of the enzyme.

GENE REGULATORY NETWORKS ESTABLISHED BY TRANSCRIPTION FACTOR-DNA INTERACTIONS
Zach Heeringa
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 112
Mentor(s): Andrea Doseff, Meenakshi Sudhakaran, Allison Barbaglia, Erich Grotewold, Gabdiel Yulfo-Soto

Regulation of gene transcription is a vital biological process of a cell and has a crucial impact on cellular responses to environmental cues. The goal of this project is to identify how transcription factors (TFs) regulate gene expression networks. TFs are proteins that bind to DNA and can either inhibit or promote gene transcription. The pathways that regulate phenolic biosynthesis provide an ideal model system to understand the architecture of the gene regulatory network (GRN). Phenolic compounds, broadly present in plants, are key chemicals in the biofuel industry and the healthy food initiatives. Maize expresses numerous phenolic compounds and provides an ideal model system to understand the phenolic biosynthesis GRN due to the abundance of genetic resources available and its economic value worldwide. Previous work from our lab identified 45 different TFs that interact with promoters of multiple phenolic biosynthesis genes. To determine the direct targets of these TFs in maize, antibodies that specifically interact with these TFs in plant tissues have been generated. TFs coding sequences were cloned onto His-SUMO vectors. Tagged His-SUMO-TFs

proteins were expressed and purified from *E. coli* and subsequently used for the generation of antibodies. GST-TFs proteins were used for antibody purification. The specificity and affinity of the antibodies obtained was tested by western blots. These reagents constitute essential tools for determining TFs-DNA interactions *in vivo* by ChIP. Overall, these studies will provide a better understanding on how biotic and abiotic stress conditions regulate phenolic biosynthesis as well as overall gene expression in maize.

THE ROLE OF TSPO IN MODULATING THE KYNURENINE PATHWAY IN A MOUSE MICROGLIAL CELL LINE
Anooj Arkatkar
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 113
Mentor(s): John LaPres

Microglia are the resident macrophages of the central nervous system. During neuroinflammation, microglia are activated and increase the expression of the translocator protein (TSPO). Though TSPO ligands have been used for imaging of patients for the diagnosis of neuroinflammation for decades, the role of TSPO in the inflammatory process remains largely unknown. Our laboratory has recently shown that microglia activation alters the expression of genes that encode enzymes of the kynurenine pathway. The kynurenine pathway converts tryptophan into nicotinamide and other metabolites. Importantly, PK11195, a TSPO ligand, was also shown to regulate the expression of genes that encode enzymes of the kynurenine pathway. Kynurenine metabolites have further been studied as potent ligands for the Aryl Hydrocarbon Receptor (AHR), which has been implicated in crosstalk with TSPO in kynurenine regulation. The aim of this study is to better characterize the role of TSPO in modulating the kynurenine pathway. We have analyzed all of the metabolites in the kynurenine pathway in BV2 cells, a mouse microglial cell line, and BV2s that have been engineered to lack TSPO (TSPO-/- cells). We show that loss of TSPO significantly impacts different metabolites within the kynurenine pathway in the presence and absence of activation. In addition, treatment with PK11195 also impacts several of these metabolites. Our data indicate that TSPO plays an active role in modulating the kynurenine pathway. These results suggest that kynurenine metabolites play a role in microglial activation and that TSPO could be an important target for novel neuroinflammatory therapeutics.

THE ORIGINS OF LIFE
Miah Turke, Jack Huber
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 114
Mentor(s): R Root-Bernstein

In 1953 Stanly Miller first demonstrated that an apparatus that simulated prehistoric earth conditions could synthesize important amino acids (Miller 1953). Similar experiments involving different gases, or different energy sources such as UV light or extreme heat have been carried out and have produced other compounds, such as sugars, nucleotides, and other biomolecules (Fitz 2007). None of these experiments have synthesized multiple classes of compounds in one apparatus. We have repeatedly made diverse amino acids, sugars, fatty acids, ATP and cAMP by supplementing Miller's distilled, deionized water with sterile sea salts, calcium phosphate and magnesium sulfate.

MODELING INTERACTIONS BETWEEN INTRAMEMBRANE METALLOPROTEASE, SPOIVFB, AND ITS SUBSTRATE, PRO-sK
Jordyn Vanportfliet
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 115
Mentor(s): Lee Kroos, Daniel Parrell

Bacillus subtilis is a Gram-positive, aerobic bacterium found in the soil. In stress conditions, such as starvation, this bacterium sporulates through the formation a small cell called the forespore inside a larger mother cell. It is known that this is done through coordinated signaling involving the sigma factor, sK. sK is made when its precursor Pro-sK is cleaved from the outer membrane of the forespore. This cleavage helps signal the mother cell to form a coat around the forespore in preparation for the lysis of the mother cell. In the cell membrane, Pro-sK is specifically cleaved through an interaction with an intramembrane metalloprotease SpoIVFB. Our research goal is to look more closely at the interaction between Pro-sK and SpoIVFB, with the hopes of creating a model showing where the proteins fit together. We believe a short loop in the fourth alpha helix of SpoIVFB helps to position Pro-sK, allowing for processing. We will look at this

positioning by completing a series of crosslinking assays with various cysteine (Cys) substitutions in both proteins, Pro-sK and SpoIVFB. Crosslinking assays take advantage of the potential for strong disulfide bonds when Cys residues are close enough to form a Cys-Cys bond. These bonds are able to be seen through Western blot analysis even after the cell membrane is broken. With this information we will be able to better understand the cleavage processes of Pro-sK by SpoIVFB and apply that knowledge to similar systems involving homologous proteins present in organisms ranging from bacterial pathogens to humans.

SUSPECTED DOMAIN SWAPPING IN APO HUMAN FATTY ACID BINDING PROTEIN 5 (HFABP5)
Joelle Eaves, Zainab Salah, Wylie Joynt, Mustapha Akhdar
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 116
Mentor(s): James Geiger, Nona Ehyaei

Any three-dimensional, tertiary protein structure is characteristic to its polypeptide sequence, from which protein folding occurs spontaneously, driven by intermolecular forces (e.g., hydrophobic interactions: responsible for interior positioning of hydrophobic residues). Two or more tertiary protein structures may combine, forming higher-order oligomers. Intracellular lipid binding proteins (iLBPs) are low molecular weight proteins containing hydrophobic binding regions, which enable transport of hydrophobic molecules in cytosol. Previous research has found that some of the iLBP family dimerize via domain swapping, where identical structural elements exchange between two monomers. We have reported structures of both apo and retinol-bound domain-swapped (DS) dimers of cellular retinol binding protein 2 (CRBPII) which showed a large conformational change in the DS dimer upon ligand binding, potentially explaining allosteric behavior proposed for iLBPs. Fatty acid binding proteins (FABPs)?an iLBP subfamily?are responsible for fatty acid solubilization and transport. Holo human fatty acid binding protein 5 (hFABP5) has been reported to domain swap in bacterial expression, naturally palmitic acid-bound. To investigate whether ligand-induced conformational change also occurs in FABP5, we attempted to obtain the apo protein. Unfortunately, efforts to remove all fatty acids from FABP5 DS dimers have been unsuccessful, presumably due to tight association of the fatty acid in the DS dimer. It is predicted that mutating residues which interact with the ligand, specifically R129A, will increase apo dimer FABP5 expression. This mutation switches an arginine, which forms a salt bridge with the ligand, to a smaller, neutral alanine, promoting apo expression likelihood by decreasing binding affinity.

DIFFERENTIAL REGULATION OF LIPID DROPLETS BY CYTOKINES IN PANCREATIC BETA CELLS
Abhijeet Suryadevara
Biochemistry and Molecular Biology, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 195
Mentor(s): L. Olson

Diabetes mellitus is one of the most common diseases in the world. The disease disrupts insulin production or sensitivity, resulting in high blood glucose levels. Proinflammatory cytokines, such as interferon gamma (IFN_γ) and interleukin-6 (IL-6), are secreted by immune cells and contribute to pancreatic β cells dysfunction or death, resulting in loss of insulin secretion. Lipid droplets (LDs), the storage organelle for triglyceride (TAG), have emerged to be regulated by environmental cues and thus affect cellular function. We investigated the effects of proinflammatory cytokines on TAG metabolism and LD dynamics in β cells *in vitro*. INS-1 cells were treated with IFN_γ or IL-6 for 12h and 24h, after which genes that regulate TAG lipolysis and LD formation, e.g. *Atgl, G0s2, Plin1, Plin2 and Plin 5,* were examined with real time qPCR. LDs were visualized via Oil Red O staining in INS-1 cells treated with each cytokine for 24h. Our data showed that IFN_γ and IL-6 differentially regulated expression of genes involved in lipid droplet formation, suggesting an opposing action on lipolysis and LD formation. IFN_γ-treated cells showed increased numbers of LD clusters, while IL6-treated cells had significant reduced numbers of LDs. In final, our study demonstrated that IFN_γ and IL-6 had opposing actions on TAG metabolism and storage in β cells: IL-6 induces lipolysis while IFN_γ inhibits lipolysis and increases LDs accumulation. This study is important towards understanding the pathogenic actions of cytokines on ß function and survival, and identifying therapeutic targets that can modify cytokines-mediated effects on β cells.

GENE SPECIFICITY AND INTERACTIONS BETWEEN THE RBF2 AMINO-TERMINAL DOMAIN AND E2F2
Jenny Menko
Biochemistry and Molecular Biology, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 196
Mentor(s): Stacy Hovde

The RB-E2F system plays an important role in monitoring cell reproduction. The protein E2f2 activates transcription while Rbf2 acts to repress E2f2. In other words, Rbf2 acts as a tumor suppressor, making the interaction and binding affinity between these two proteins important in understanding the regulation of cell reproduction. Unlike Rbf1, which interacts with E2f1 and E2f2, Rbf2 interacts with E2f2 only. Rbf2 has an additional amino-terminal domain that is not found in Rbf1. I hypothesize that the amino-terminal domain of Rbf2 plays a significant role in its gene specificity and binding affinity for E2f2. If the functionality of this domain is hindered, then the control of E2f2 will also be hindered. To test this hypothesis, *Drosophila melanogaster* is used as a modeling system and a protein-protein interaction assay will be performed. Various domains of the histidine-tagged and untagged Rbf2 and E2f2 proteins will be produced through *E. coli* expression and purification. Using a nickel affinity chromatography column, the binding affinity between various domains will be observed. Testing will include binding assays of untagged proteins to tagged proteins that have been immobilized on the nickel agarose beads. The binding affinity of tagged Rbf2 to untagged E2f1 will be used as a positive control while the binding affinity of untagged E2f2 to nickel agarose beads will be used as a negative control. The goal is to determine whether the Rbf2 amino-terminal domain increases gene specificity for E2f2.

BASE-PAIR-LIKE HYDROGEN BOND PATTERNS CONTRIBUTE TO SPECIFICITY IN PROTEIN-LIGAND COMPLEXES
Casey Borowsky
Biochemistry and Molecular Biology, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 197
Mentor(s): Leslie Kuhn

Throughout living organisms, proteins interact with various ligands (small organic molecules) to carry out the processes of life. Interactions conveying specificity between proteins and ligands are often hydrogen bonds (H-bonds). H-bonds create specific binding patterns that lock proteins and ligands into complexes. While single H-bonds are known to be important in this process, it remains unknown whether spatial motifs formed by multiple, neighboring H-bonds occur across many protein complexes. Such multiple H-bond interactions could increase the specificity of protein-ligand binding. This project aims to determine if base-pair-like H-bonding, observed most notably in the formation of double-stranded DNA, occurs between protein and ligands as a recurring spatial pattern. Based on the energetic stability of base-pair interactions, similar interactions should be favorable between proteins and ligands. To test this hypothesis, patterns involving multiple local H-bonds were identified by software developed in our lab, categorized by 3-dimensional structural visualization, and statistically analyzed. Analysis of 136 diverse protein-ligand complexes revealed that base-pair-like interactions do occur between proteins and ligands, and in surprising abundance across different ligand types. Investigation into the chemical groups participating in base-pair-like motifs suggests a code of chemical complementarity that will be beneficial for predicting or designing the structure of a ligand molecule to match the binding site on a protein. This analysis of biochemical H-bonding patterns observed in known protein-ligand complexes provides critical insights for ligand and drug design.

UNDERSTANDING THE TRANSCRIPTIONAL COREPRESSOR ACTIVITY OF CTBP
Robby Teis
Biochemistry and Molecular Biology, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 198
Mentor(s): Ana-Maria Raicu, David Arnosti

CtBP is a transcriptional corepressor protein that plays critical roles in cell growth and development. As a co-repressor, this protein binds to transcription factors to exercise its repressive activity. CtBP is unique in that it is both a transcriptional repressor and also a dehydrogenase, with three glycine residues forming the primary NAD cofactor binding site. However, the relationship of the dehydrogenase activity to its transcription regulation is currently unknown. Using molecular cloning techniques, I am constructing a plasmid in which a nuclease dead Cas9 enzyme is fused to the coding sequence of CtBP and CtBP mutants. The dCas9 is used to recruit CtBP anywhere on the genome through gene-specific single guide RNAs. To better understand CtBP activity, I will create Cas9 chimeric proteins bearing NAD-binding domain mutant CtBP and an active site mutant. Next, the plasmids will be injected into Drosophila melanogaster

embryos to create transgenic fly lines expressing the dCas9-CtBP fusions in a tissue-specific manner. We will perform a comparative analysis of CtBP activity on diverse genomic sites and assess the differences in repressive activity in the two mutants. This study will inform our understanding of CtBP activity and shed light on the importance of the dehydrogenase activity for transcriptional repression.

LANTHANOPHORE: A HIGH-AFFINITY BINDING MOLECULE FOR THE TRANSPORT OF RARE EARTH ELEMENTS IN METHYLOBACTERIUM EXTORQUENS AM1
Madeline Martin
Biochemistry and Molecular Biology, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 199
Mentor(s): Paula Roszczenko-Jasinska

Lanthanides, also known as rare earth elements (REE), are crucial in a lot of the technologies we have today because of their unique physical and chemical properties. Hundreds of thousands of tons are mined annually to supply the growing demand. REE are highly insoluble in water and they are rarely found in their pure form. For many years REE were considered biologically inert, but in recent years it has been found that some lanthanides can serve as cofactors for alcohol dehydrogenases in bacteria. The mechanism of sense and uptake of lanthanides is still unknown. We hypothesize that there is a specific transport molecule, "lanthanophore" that is produced and released by our model organism, *Methylobacterium extorquens AM1*. Lanthanophore has a high binding affinity towards lanthanides and assists in transporting these highly insoluble metals from the surrounding environment into the cell. First, in our research, we needed to find the best growing condition for *M. extorquens* AM1 to release a high concentration of lanthanophore into the growth media. Then we purified and identified lanthanophore by implementing different chromatography techniques including solid-phase extraction, size-exclusion chromatography, and HPLC. After each step of purification, we used a biochemical assay, called Arsenazo III assay, to identify fractions that contained lanthanophore. Mass spectrometry will be implemented for further analyses. Understanding the mechanisms and components of lanthanide transport systems in microorganisms can lead to the use of bacteria for recycling REE from electronic waste mitigating additional pollution and decreasing costs of REE.

DEVELOPING RAPID METHODS OF DNA EXTRACTION FOR BIOSENSING APPROACHES
Nick Saba
Biochemistry and Molecular Biology, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 200
Mentor(s): Evangelyn Alocilja, Saad Sharief

Extracting DNA from microbes is an important part of biological research in many fields. Diagnostics for infectious diseases and even cancer use DNA as an integral part of testing. Yet, the standard kit method of DNA extraction is both costly and time consuming. Using this "kit" method is laborious, and requires resources that are not always available in low income areas where human health crises are prevalent. Thus, a better DNA extraction method is needed. In this work, two alternative methods were tested: boiling and paper adsorption. The boiling method involves heating in water whole bacterial cells to break them open and expose the DNA. While this method is faster and more cost-effective, it does not yield pure DNA. The "paper" method that was tested is much faster than the kit method, and it yields pure DNA samples. This method uses cellulose-based paper that captures nucleic acids and retains them with only one cleansing step. The goal of this project was to compare the different DNA extraction methods to determine the efficiency, reliability, and resource requirements of each method and determine which one would be the most efficient for low income facilities. Preliminary results for the existing kit and boiling methods have yielded expected outcomes, with future tests needed to completely verify the paper method and compare each method side-by-side. The new paper method appears to be the best in each of these areas, and it would be applicable for use in resource-poor areas.

ROLE OF AMINO ACID RESIDUE INTERACTIONS IN INTRAMEMBRANE PROTEASE SPOIVFB DURING SPORULATION
Erica Nowosielski
Biochemistry and Molecular Biology, Poster Presentation
Section: 5, 3:00 - 4:30 PM, Ballroom
Presentation Number: 281
Mentor(s): Lee Kroos, Daniel Parrell

Under unfavorable conditions, some species of bacteria divide asymmetrically during a process called sporulation to produce dormant cells called spores. The bacterial cell can then lyse to release the spore, which can more easily endure the harsh conditions. Many species undergo sporulation, such as *Clostridium botulinum*, the bacteria associated with botulism and *Clostridium tetani*, associated with tetanus. Sporulation is important for public health issues such as hospital hygiene, food processing, and plumbing. My research addresses the role of a short loop of intermembrane metalloprotease (IMMP) enzyme SpoIVFB in orienting transcription factor Pro-σK for a cleavage reaction. The cleavage reaction happens during forespore engulfment and allows the cell to prepare the dormant forespore for release. Amino acid residues in the short loop of SpoIVFB are thought to interact with Pro-σK and affect its processing. My experiments test which short-loop residues are critical for Pro-σK orientation using alanine substitutions during *in vivo* cleavage assays. I hypothesize that changes to the amino acid residues will negatively impact Pro-σK processing. One method I will use is cobalt affinity purification to co-purify inactive SpoIVFB E44Q with His-tagged Pro-σK. I will present on my methods, which include cleavage assays and progress toward pulldown assays. My goal is to determine probable interactions between SpoIVFB and Pro-σK. As IMMPs are conserved among all domains of life, understanding SpoIVFB interactions may be applicable to understanding other IMMP-substrate interactions.

ADHESIVE PROPERTIES OF GECKO FEET
Erin Foley
Biochemistry and Molecular Biology, Poster Presentation
Section: 5, 3:00 - 4:30 PM, Ballroom
Presentation Number: 282
Mentor(s): Carl Boehlert, Per Askeland

Geckos have the ability to adhere to any vertical or upside-down surface, whether smooth, rough, wet, or dry. Although, they do not have a "sticky" residue; they utilize a type of nanotechnology called draping adhesion to adhere to surfaces. They have microscopic, viscoelastic hairs called setae that stick to surfaces via van der Waal forces between the setae and molecules in the surface. They can reverse their adhesion using their tendons to retract the microscopic hairs, in a matter of milliseconds while traversing along surfaces. A team of scientists at the University of Massachusetts Amherst have even created a synthetic adhesive material called "Geckskin" that mimics gecko toepads. Although this material does not use nanotechnology, they incorporate draping adhesion by using a soft elastomer and a stiff fabric to mimic the pad and the skin.

HETEROLOGOUS EXPRESSION OF LANTHANIDE-DEPENDENT METHANOL DEHYDROGENASES IN METHYLOBACTERIUM EXTORQUENS AM1
Carly Suriano
Biochemistry and Molecular Biology, Poster Presentation
Section: 5, 3:00 - 4:30 PM, Ballroom
Presentation Number: 283
Mentor(s): Norma Martinez Gomez, Nathan Good

Methylotrophy is the ability to use reduced carbon compounds with no carbon-carbon bonds as the sole source of carbon and energy. Lanthanide elements (Ln) serve as cofactors for pyrroloquinoline quinone alcohol dehydrogenases, such as XoxF-type methanol dehydrogenases (MDH). XoxF-type MDH are ubiquitous in methylotrophic communities and can be divided into five distinct phylogenetic clades. Using an MDH genetic knockout strain of model methylotroph Methylobacterium extorquens AM1, a functional complementation study was conducted to assess the ability of heterologously-expressed divergent XoxF enzymesto restore methylotrophic growth. Phenotypic analysis on methanol indicated successful complementation by XoxF enzymes from the extremophile methanotroph Methylacidiphilum fumariolicum SolV and a Verrucomicrobium mesophile. MDH activity of cell-free extracts from complemented strains were similar to activity measurements for the wild-type strain. Growth rates of complemented strains, however, were significantly reduced compared to the wild-type strain with methanol. Genomic, biochemical, and transcriptional evidence indicate the Type V XoxF of M. extorquens oxidizes methanol to formaldehyde, a key intermediate tied to the production of NAD(P)H needed for carbon assimilation. The Type II XoxF of M. fumariolicum, on the other hand, fully oxidizes methanol to formate in its native host. We hypothesize that the

discrepancy in end product of methanol oxidation could be the cause of the reduced growth rate observed in our complementation studies. Genetic and metabolomic analyses will provide further insight into the underlying mechanisms preventing restoration of wild-type growth when functional complementation of MDH activity is achieved, providing fundamental knowledge of Ln-dependent MDHs and their impacts on methylotrophy.

STRUCTURE AND FUNCTION OF DROSOPHILA MELANOGASTER INSULIN RECEPTOR GENE REGULATORY REGIONS
Maddy Niblock
Biochemistry and Molecular Biology, Poster Presentation
Section: 5, 3:00 - 4:30 PM, Ballroom
Presentation Number: 284
Mentor(s): David Arnosti

Insulin signaling is a highly conserved process in eukaryotes, playing vital roles in the life of many organisms, including humans. Insulin is released by the pancreas in response to high glucose levels in the bloodstream, resulting in glucose absorption by the surrounding cells. The regulation of blood glucose levels is mediated by the insulin receptor (INSR) protein found in cell membranes, to which the insulin hormone binds. The fruitfly Drosophila melanogasteralso relies on insulin signaling for development and metabolic regulation. We are using molecular cloning techniques, to create plasmids containing fragments of the Drosophila insulin receptor (InR) genomic region to better understand the importance of each fragment in regulating transcriptional activity. InRhas been divided into 25 sections. Of particular interest are four regions, which our lab has found to be enhancers of InRexpression. Each of these four 1.5kb regions have been further subdivided and inserted into a luciferase vector which will be transfected into S2 cells to determine their activity. This study will help us uncover important InRregulatory elements, providing insight into its activity. Upon understanding of InRregulatory elements in Drosophila, uncovering the processes in human insulin receptor (INSR) protein, and what regulates them, will become much easier.

CHANGING DIETARY FAT CONTENT POST-PUBERTY INFLUENCES MOUSE BONE DENSITY
Teja Mogasala
Biochemistry and Molecular Biology, Poster Presentation
Section: 5, 3:00 - 4:30 PM, Ballroom
Presentation Number: 285
Mentor(s): Jonathan Schepper, Richard Schwartz, Narayanan Parameswaran, Laura Mccabe

The typical Western (American) diet contains high amounts of fat and low amounts of fruits and vegetables (USDA report). High dietary fat intake is known to be unhealthy and increase the risk of osteoporosis which is characterized by reduced bone volume fraction (BVF) and/or strength as well as increased fracture risk. Clinical studies suggest that fat intake can have different effects on the body during pre-puberty vs adult stages. This study examined the impact of a high fat diet, given pre- and/or post-puberty, on mouse BVF. 3-week-old male mice were initially fed either a low (LFD)- or high (HFD)- fat diet. Half of the mice underwent a diet change after 10 weeks, switching from LFD to HFD and vice versa, while the other half continued their initial diet for 16 more weeks. Similar to previous studies in our lab, long-term HFD caused a 30% decrease in BVF compared to LFD mice. Switching diets in the mice at 10 weeks resulted in BVFs that corresponded more with the dietary fat content in their adult diet. Specifically, mice that underwent the HFD to LFD switch had BVFs 23% higher than the group that had solely HFD mice. In contrast, the mice receiving the LFD-HFD switch actually had BVFs 25% lower than HFD mice. Trabecular microarchitecture analysis (trabecular number, thickness, spacing) corresponded with the BVF changes. This implies that a switch to LFD at adulthood can prevent decreased BVF associated with a long-term HFD. On the other hand, switching to a HFD later in life can further reduce bone density. These findings suggest that bone volume can still be recovered or lost if diet is switched later in life.

EXAMINING CHANGES IN EXPRESSION OF ORANGE CAROTENOID PROTEIN HOMOLOGS IN FREMYELLA DIPLOSIPHON IN RESPONSE TO NUTRIENT-DEPRIVED CONDITIONS
Isabel Petrescu
Biochemistry and Molecular Biology, Poster Presentation
Section: 5, 3:00 - 4:30 PM, Ballroom
Presentation Number: 286
Mentor(s): Preston Dilbeck, Beronda Montgomery

Fremyella diplosiphon is a cyanobacterium with the ability to convert energy from sunlight into usable chemical energy through the process of photosynthesis. Cyanobacteria, including *F. diplosiphon*, use nonphotochemical quenching (NPQ) of the phycobilisome, the light-harvesting cyanobacterial antenna, to protect against excess light absorption, which would cause cellular damage from reactive oxygen species (ROS). NPQ is mediated in cyanobacteria by the orange

carotenoid protein (OCP). Homologs of *ocp* encode a group of proteins with diverse functions in response to stress conditions. For example, a lack or limitation of iron represents a stressful growth condition and decreases the growth rate of these organisms. Limitations in other nutrients (e.g., nitrogen) also negatively affects growth. In both cases, cells reduce photosynthetic pigment content and are, therefore, subject to damage from excess light. Thus, *ocp* homologs are expected to play a role in protecting cells under nutrient-deficient conditions. Comparisons were made between the wild type (SF33) strain and a mutant (**?***rcaE*) strain incapable of detecting changes in external light grown under low intensity red and green light in iron-depleted versus iron-sufficient media. Low intensity white light conditions were tested for SF33 under nitrogen-limited versus nitrogen-sufficient growth conditions. Both iron and nitrogen deficiency render cells hypersensitive to light-induced damage, even at low light intensities. The expression of the two homologs of full length OCP (OCP1 and OCP2), a protein homologous to the N-terminal domain (HCP1), and a protein homologous to the C-terminal domain (CTDH) under nutrient limitation compared to growth in replete media will be discussed.

BUSINESS

NOT SO SIMPLE MOVING AVERAGES
Nic Weller, Justin Bennie,
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 35
Mentor(s): Antoinette Tessmer, Kirt Butler

Our research investigates whether randomness in a buy and hold portfolio is as rewarding as a more frequent buy and sell approach. A first portfolio of one million dollars is invested in twenty six companies selected at random. The portfolio is then held unchanged. A second portfolio (b) of one million dollars is also built at random but frequent buy/sell orders are placed subsequently. Changes in portfolio B are based on a technical analysis: using the simple moving averages, stocks are bought when their price moves above the moving average and sold when their price moves below. Both portfolios are observed and compared over a period of time. Our research result may support various market insights and offer an interesting perspective into methods for improving risk to reward ratio.

SHOULD AMATEUR INVESTORS CONSIDER ADDING INTERNATIONAL BANKS TO THEIR PORTFOLIO?
Megha Gowda
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 36
Mentor(s): Antoinette Tessmer, Kirt Butler

The focus of this research is to determine the risk that is involved when investing in the Banking sector. Our portfolio is geographically diversified by investing a total of $1 million USD, split evenly among 29 countries, across 5 continents. This portfolio is consistently compared with an American stock index (S&P 500) and an international stock index (GDOW) to evaluate its growth and market risk. The findings of our research show that our portfolio has a lower risk in comparison to the other indexes. Although various economic conditions can concern bank investors, the global diversification helps counter negative effects. It is interesting to see how this portfolio follows the general graph of the Global and American stock market index but with less extreme peaks (less risk.)

ADVANCED TECHNOLOGIES IN SUPPLY CHAINS OF UNITED STATES COMPANIES
Alexandra Smith, Diana Reyes
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 37
Mentor(s): Sriram Narayanan

The field of supply chain management is utilizing advanced technologies now more than ever. This poster analyzes the use of three specific advanced technologies used by companies today. These advanced technologies include internet of things (IoT), 3D printing (additive manufacturing), and artificial intelligence. This presentation studies how specific companies are utilizing them by drawing on their Annual Reports of 2017. Internet of things is utilized by Cisco, United Technologies, and Disney to connect devices to the Internet and gain data from this knowledge to continuously improve their process. In addition, 3D printing is used especially by companies such as Dow Chemical, Honeywell, and BMW to save costs and improve efficiency in order to advance their businesses going forward. Also, companies such as Apple,

John Deere, and Uber utilize artificial intelligence to improve efficiency, speed, accuracy, and much more. The presentation aspect will be displayed using a poster and will be split up into two major parts. First, the presentation will introduce these three topics in supply chain and how they are relevant and growing in the industry today. Next, the presenter will be more specific in mentioning how each specific company listed is implementing these advanced technologies and how that is contributing to the company being an innovator in its industry. The presenter will also draw overall directions for the supply chain based on these three technologies.

AN ALTERNATIVE SUPER BOWL EFFECT
Jacob Gleason, Hamzah Siddiqui, Kevin Kimmel
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 38
Mentor(s): Antoinette Tessmer, Kirt Butler

The Super Bowl Effect is a well-known phenomenon in the finance world. It states that if the NFC team wins the Super Bowl, the Dow Jones is likely to finish higher at the end of the year, and if the AFC team wins, it is more likely to finish lower. Is it possible that this effect is a coincidence? We want to try and find a more reasonable and substantial strategy to invest around the Super Bowl. We have built three portfolios to observe the effect the Super Bowl may have on certain stocks, not the stock market as a whole. We chose the Super Bowl because it is one of the highest viewed events worldwide every year. It is a prime opportunity for companies to get their product in front of millions of eyes every year. One portfolio features investments in companies that are official sponsors of the NFL, another portfolio compares and contrasts food and drink companies that may or may not be prominent in Super Bowl advertising, and the last portfolio includes a variety of athletic companies along with companies which feature advertisements during the Super Bowl. Our results may provide insights on an investment strategy based on sporting events; if it is shown that some well-targeted investments are positively affected by sporting events, sports savvy investors may want to time these opportunities for a quick and substantial gain.

BRICK AND MORTAR RETAILERS' CHRISTMAS SEASON STOCK PERFORMANCE
Emily Staple
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 39
Mentor(s): Antoinette Tessmer, Kirt Butler

As the Christmas season approaches, many shoppers increase their retail buying habits. Today, many shoppers turn to the internet to make these purchases. Over the course of this study online retailers were shunned, in favor of traditional retailers. The purpose of this study is to see how traditional brick and mortar retail stores perform during the holiday period. The analysis is based on a portfolio comprised entirely of brick and mortar retail stocks. Stocks were purchased using the website Stocktrak with a $1,000,000 budget. Data collection from the stocks occurred over seven months. Using statistical analysis, the performance of these stocks was studied. As a comparison, data was also collected from the S & P 500 and Amazon. The differences between all pieces of data collected were studied. Investors can look to this study as an indicator of consumer shopping habits during the holiday season. If an investor believes that the Christmas season brings unusual returns from brick and mortar retail operations this study can be used as evidence.

STOCK DIVERSIFICATION: DOES IT WORK?
Josh Ishbia, Jack Liszewski, Jake Weiss, Maxwell Stanecki
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 40
Mentor(s): Kirt Butler, Antoinette Tessmer

Our research analyzes seven months of data on various investment portfolio strategies to determine whether portfolio diversification is an effective strategy, and different ways in which an investor could build a diversified equity portfolio. Our portfolios are meant to demonstrate why stock investors should diversify. Our results minimize risk and generally follow the overall behavior of the market, which has a historical track record of positive returns. We collect data through the use of StockTrak. Starting with one million dollars per portfolio, we each follow a different diversification strategy. Our returns of our personal portfolios over seven months are compared to the S&P 500 benchmark. As we all attempt to diversify risk, we expect average returns. Stock portfolio diversification helps maintain constant returns while also eliminating the risk of a drastic market change.

DO SPORTING EVENTS AFFECT THE VALUE OF SPORT-RELATED STOCK?
Connor Orourke
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 41
Mentor(s): Antoinette Tessmer, Kirt Butler

The purpose of this study is to better understand the effect of specific, industry-centric events on an industry-specified portfolio; in this case the sport equipment and entertainment industry. Using StockTrak, the value of a million dollars, 26 company portfolios are being compared to the S&P 500 as a standard. Throughout the term of this portfolio, large scale sporting events are being identified in order to compare portfolio performance around these events with the theoretically indifferent standard. Using the outcome of this study, an understanding can be found of how sporting events affect company performance. This may aid investors as a way to better learn how to build a short-term portfolio to take advantage of the possible effects.

A FURTHER EXAMINATION AT MEASURING CUSTOMER DELIGHT IN THE HOSPITALITY BUSINESS INDUSTRY
Olivia Orlando
Business, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 267
Mentor(s): Mi Ran Kim

Although customer satisfaction has been the goal for many years, not only in the hospitality industry but also universally in business, that perspective has shifted with the adaptation of customer delight practices. In the era of self-improvement and dedication to creating stronger relationships, the hospitality business is following suit to these trends. Customer delight, defined as "profoundly positive emotional state generally resulting from having one's expectations exceeded", has shaped the hospitality industry into a revolutionary business devoted to fashioning the best possible experience and service for customers. Customer delight demonstrates a stronger effect on loyalty, repetitive purchase behaviors, and competitive advantages. Despite the growing body of literature that supports the importance of customer delight, there are limited studies aimed at developing a scale to measure delight. In the hospitality literature in particular, there are no extant scale items to measure customer delight for the hospitality business context. Thus, the purpose of this study is to generate an initial pool from qualitative research as the first stage of scale development. About 15 people across the U.S.A. with a variety of demographic attributes such as age, education, occupation, and residents were invited to the interview with a researcher. First, an interviewer provided the definition of customer delight to each interviewee. Then, they were asked to recall if they had any delightful experience during their stay at a hotel or dining at a restaurant within the past six months. The findings and implications will be followed.

NOT ON MY TRUCK: DELAYED COMPLIANCE WITH THE ELECTRONIC LOGGING DEVICE MANDATE
Regin Horan
Business, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 268
Mentor(s): Jason Miller

The Department of Transportation required that most large commercial trucks have electronic logging devices (ELDs) installed by December 18, 2017. However, industry experts noted a large number of firms were not compliant with the ELD mandate during this "light enforcement period", instead, chose to wait until just before "strict enforcement" started on April 1, 2018. Firms resisted compliance due to the common belief that ELDs would reduce their firm's productivity and, consequently, could threaten their survival. This research examines motor carrier traits that influenced whether carriers were compliant with the ELD mandate during the "light enforcement" period using publicly available survey data. Our results suggest that the carriers' range of operations and size significantly influence likelihood of compliance to the mandate. We find that carriers operating over wider geographic ranges are more likely to be compliant, which is consistent with arguments that wider range of operations increases exposure to inspections and benefits from using monitoring technologies. We also find larger carriers are more likely to be compliant, which likewise aligns with arguments that the larger the size, the greater the exposure to inspectors and greater ability to reap the benefits of monitoring technologies. We further find significant effects related to time of the survey, commodities hauled, and US Census Bureau region of incorporation. Our results shed further understanding concerning factors that affect firm's decisions to comply with regulatory mandates.

AN ANALYSIS OF JD.COM'S SUPPLY CHAIN MANAGEMENT PRACTICES WITHIN THE CONTEXT OF THE E-COMMERCE
Frank Wang
Business, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 269
Mentor(s): Steven Melnyk

China has become a fertile ground for the e-commerce industry. JD.com, as an e-commerce giant in China, is leading the logistics innovation in the world. This research aims to explore the e-commerce industry in China and to identify the best practices in JD.com 's supply chain. The findings will help scholars to understand the real supply chain practices of JD.com as well as e-commerce industry.

UNCHARTED TERRITORY: WHAT DETERMINES PROFIT AT THE SUB-INDUSTRY LEVEL
Lydia Whipple
Business, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 270
Mentor(s): Matthew Schwieterman

Much work has been undertaken over the past fifty years to determine the success of firms in relation to their vertical exchange relationships with other firms. Specifically, research has uncovered how characteristics of the industry of the parties, or alternately, how specific elements of the dyadic relationship itself determines the profitability of the firms involved. Prior research varies in methodology from in-depth, economic studies at the industry level, to nuanced observational surveys of firms within the context of vertical exchange dyads. Our work seeks to fill the gap in the literature between the industry and the dyadic level to explicate the factors associated with sub-industries as they relate to buyer power and profitability. We leverage a large, underexplored database to delineate the factors that impact buyer power and profitability, unique from the macro-perspective of industry or the micro-perspective of the dyad. These findings offer deeper insights into how academic theory can make progress by exploring different units of analysis and provides practical value to firms as they navigate the complex and high-stake world of buyer-supplier relationships.

MARIJUANA LEGALIZATION IN MICHIGAN: COULD IT AFFECT YOUR FUTURE EMPLOYMENT?
Sydney Lintol
Business, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 271
Mentor(s): Jeffery Elsworth

How much thought has been given to the Michigan Proposal 1, Marijuana Legalization Initiative (2018) and how it may affect students as future employees, managers and leaders in the workplace? Do students know that smoking Marijuana could affect their chances for employment, continuous employment, and workman's compensation if you are injured? This research primarily explores students' knowledge and perceptions of the impact marijuana legalization might have on their employment in Michigan and other recreational marijuana legal states. Research on this topic will help inform future employees and current managers as to the perceptions of what is acceptable regarding the use of marijuana and workplace policies.

SHORT TERM EFFECTS OF INVESTING IN RESEARCH BASED SCIENCE COMPANIES
Andrew Waack, Joshua Johnson
Business, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 272
Mentor(s): Kirt Butler, Antoinette Tessmer

Companies implementing the use of the scientific method to develop new products often face years of trial and error, all in the face of extreme uncertainty for future returns. Companies sacrifice years of not making profits to hopefully develop novel technology that can eventually be successful. Accordingly, there is a strong temporal component involved in investing in companies engaged in scientific research. This study investigates the performance of a stock portfolio focused on biotechnology and pharmaceutical companies and another portfolio focused on renewable energy companies compared to the S&P 500 Index over a seven-month period. Simulated portfolios with an initial $1,000,000

were tracked using StockTrak. The purpose of this study is to determine whether investing in science based companies for short term gains is a feasible investment strategy. The results may show that investing in science based companies for short term profits is not a successful strategy. A long-term approach may be more appropriate for investing in such companies.

PERCEPTED PERSONALITY TRAITS OF LUXURY HOTELS
Olivia Orlando
Business, Oral Presentation
Section: 3, 11:00 AM, Lake Michigan Room
Presentation Number: 641
Mentor(s): Mi Ran Kim

Strong and differentiated brands are intangible assets that enhance a firm's financial value and brand equity. Brands create an identity and personality with a set of promises to customers and customers are likely to choose a certain brand that they like, and they feel that the brand they select to be consistent with their personalities. The global market for luxury hotels has grown rapidly over the past decades and is estimated to be worth $115.80 billion by 2025. Such significant growth will be due to the increasing purchasing power of consumers and an increasing number of international as well as domestic travelers. As an important emerging market, the study of brand-personality functions in this luxury hotel segment will be particularly timely for hotel marketers because brand personality is proposed to be one of the critical drivers for a strong relationship with one brand over another. However, there is little empirical research that has investigated the structures of luxury hotel brand-personality scales. Thus, the goal of the proposed research is to develop dimensions of luxury hotel brand personality. The 30 well-known luxury hotel brands were selected and compiled into a list based on results from Trip Advisor, Travelocity, and Forbes Magazine. Once the list comprised, a total of 15 participants were asked to associate personality traits that first came to mind when they thought of the luxury brands. The findings and implications will be followed.

HOSPITALITY BUSINESS STUDENTS' PERCEPTION ON WOMEN IN THE WORKPLACE
Nicole Stein, Olivia Orlando
Business, Oral Presentation
Section: 3, 11:15 AM, Lake Michigan Room
Presentation Number: 642
Mentor(s): Mi Ran Kim

Women have dominated enrollment levels at hospitality institutions over the years, holding a 65% majority of students and over half of the employees in the hospitality industry are women. Despite the growing number in the workplace, women are underrepresented in every step of the corporate ladder. This study examines men and women's view on gender disparities at the university level to examine students' perceptions of women in the hospitality business. A self-administered online survey was completed by about 200 college students. The findings of this study show that there are significant differences in perceptions of women in the hospitality business between female and males students: "There will be challenges in my career path that the opposite sex will not encounter (Mean of female: 4.03 vs. male: 2.91, 1-Strongly Disagree, 5-Strongly Agree)" "Although I have aspirations to obtain a senior level management position one day, I do not believe I will be given the same amount of opportunities as someone of the opposite sex (Mean of female: 3.38 vs. male: 2.32)," "I believe women there are fewer women in CEO-level positions than men (Mean of female: 4.16 vs. male: 3.60)," "I believe that having more women in leadership positions would have significant impacts on the wage gap, changing policies, and a diverse workforce (Mean of female: 4.47 vs. male: 3.67)." The findings of this study can help provide better insight into gender equality in the hospitality industry.

INVESTIGATING THE VIABILITY OF ALGORITHMIC TRADING
Jordan Bakke
Business, Oral Presentation
Section: 3, 11:30 AM, Lake Michigan Room
Presentation Number: 643
Mentor(s): Antoinette Tessmer, Kirt Butler

In Burton Malkiel's 1973 book "A Random Walk Down Wall Street", Malkiel supported the "Random Walk Theory", which states that past movement of the market or a stock is not a suitable predictor for future movement. Malkiel's advice is that a long-term buy-and-hold strategy is most effective because strategies using technical or fundamental analysis are unable to outperform the market over a long period of time. This research project will attempt to prove or disprove Malkiel's theory by developing an algorithmic trading strategy using Python and the QuantConnect platform and then

running the algorithm with live data. This presentation will analyze the performance of the algorithm as compared to a buy-and-hold strategy. Furthermore, this presentation will address whether algorithmic trading is a viable strategy to predict the stock market.

A DISCUSSION ON THE ROLE OF OCBS WITHIN GROUP WORK AND THEIR COMMON MODERATORS
Austin Langlinais
Business, Oral Presentation
Section: 3, 11:45 AM, Lake Michigan Room
Presentation Number: 644
Mentor(s): Hun Lee, Linnea Van Dyne

As the workplace in industry becomes increasingly scrutinized to better understand the factors that go into daily interactions between employees and the firm, organizational citizenship behaviors (OCBs) have risen up as some of the most difficult to comprehend. However, it is crucial to understand the importance of OCBs though, because they represent all of the actions that employees take which are not in their job description, such as speaking up (voice) or cooperating with their coworkers (helping). This presentation will focus on the results of a study of over 120 business students in the Broad School of Business at Michigan State University who varied in age, gender, and major as they participated in a controlled study on group work and interactions. Primarily though, this presentation will provoke a discussion on the role of OCBs in group work, provide a guide into what the moderators of the common OCBs are, and finally suggest ways for HR personnel and managers to better promote OCBs within their own firms.

THE IMPACT OF MARIJUANA ON THE LODGING Industry
Mackenzie Sappe, Jake Davidson, Jason Klee, Madison Skornicka
Business, Oral Presentation
Section: 3, 12:00 PM, Lake Michigan Room
Presentation Number: 645
Mentor(s): Seung Kim, JaeMin Cha

Over the past decade, marijuana, both recreationally and medically, has been legalized in many states throughout the United States. Today, ten states and the District of Columbia have legalized marijuana recreationally and another 22 states have legalized marijuana for medical purposes. The hospitality industry has begun to include marijuana in a wide variety of products and services, from CBD Oil massages to THC infused sparkling water. The purpose of this research is to propose an understanding of the attitudes of guests towards marijuana in hotels and to discuss the opportunities and challenges of assimilating marijuana into hotels. A literature review will be conducted to understand the current atmosphere surrounding marijuana in the United States, in general, and in the hospitality industry, specifically in hotels. With this knowledge, an online survey will be created to further investigate the attitudes and behaviors of lodging guests toward marijuana. A snowball method will be employed by the distribution of an online survey link shared through Facebook for Baby Boomers (1946 - 1964). This survey will be distributed to college students, representing Millennials (1981 - 1996) and Generation Z (1997 - 2010), through classes. Interviews will also be conducted with a wide variety of hotel operators to understand the challenges, risks, and opportunities associated with marijuana in hotels. Based on these findings, specific implications for hospitality companies, limitations of the study, and recommendations for future study are discussed.

TRANSPARENT ARTIFICIAL INTELLIGENCE IN BUSINESS: SUPPORTING MANAGEMENT DECISION MAKING
Dan Iancio
Business, Oral Presentation
Section: 3, 12:15 PM, Lake Michigan Room
Presentation Number: 646
Mentor(s): Antoinette Tessmer

How can we better support management decision making with data driven tools? With the emergence of artificial intelligence (AI) and machine learning in business, managers often debate the benefit and cost of machine learning systems. The benefits being that machine learning can uncover patterns unseen by the human eye in vast amounts of data and provide insights that are incredibly useful to executives. The costs being that these algorithms can often be opaque and how the algorithm arrives at a decision can be incomprehensible by humans which presents a growing challenge to management teams: How can we trust the decision of an algorithm if we aren't sure how it makes decisions? How can we balance transparency and predictive accuracy? In our case study helping a local business, we show that there is value in transparent AI systems for gaining business insight. We utilize a decision tree algorithm, C5.0, on 10 years of data to predict the firm's guest count and we attempt to optimize the model to assist the firm in its

staffing decisions by providing a data-based tool. In this presentation, we walk through (i) problem identification of the firm's staffing issues, (ii) potential solutions, (iii) discussion of why transparent AI is essential, and (iv) our analysis and results using C5.0. Leaderships of organizations should take note of the benefits of utilizing transparent AI and we hope to provide one potential tool that satisfies the transparency vs. accuracy tradeoff.

MOVING HOTELS UP THE EXPERIENCE LADDER
Sarah Michelson
Business, Oral Presentation
Section: 3, 12:30 PM, Lake Michigan Room
Presentation Number: 647
Mentor(s): Bonnie Knutson

The hottest topic in business today is brand presentation strategy. This is especially true in the highly fragmented and competitive hotel sector. For example, the recent Starwood and Marriott company merger has given Marriott 30 unique hotel brands, and guests are struggling to determine what brand experience is right for their lifestyle. The purpose of this research is to focus on the intersection of human personality and brand personality, and how to use this data to create individualized experiences for specific lifestyle segments. The current industry standard for branding is to segment by price, but I propose a new approach of lifestyle segmentation. In other words, the personality of the brand should correlate directly with the personality traits and needs of the potential guest to create a personalized experience. To reach this conclusion, I researched current marketing and branding trends, incorporated concepts from keynote speeches and ted talks, and used lessons from a human personality course. Shifting the focus of hotel branding to align with the spectrum of human personality will push the hospitality industry into the future of personalized marketing and experiences. Additional research will be needed to determine ethical means of personality data collection and the feasibility of implementation, but current research shows that customers are more likely to share personal information with brands they trust, and when they know what the data is being used for.

CELL BIOLOGY, GENETICS, & GENOMICS

ROLE OF EPITHELIAL DEVELOPMENT IN CANINE MODEL OF NONSYNDROMIC CLEFT PALATE
Abdullah Mahmood
Cell Biology Genetics and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 28
Mentor(s): Brian Schutte

Cleft palate affects 1 in 2500 live births world-wide. While surgical repair addresses immediate problems, complications can arise. A goal of our lab is to generate a dog model for cleft palate to test different surgical approaches. The dog was used as animal model because its head is fully grown in 18 months, not 18 years. We observed a dog family in the MSU colony with a high frequency of nonsyndromic cleft palate and found that the soft tissues of the palate shelves, including epithelial layers, continue to grow postnatally to narrow the gap. Our objective is to test whether presence and function of epithelial cell layers are normal in pups with cleft palate in this colony. We performed immuno-fluorescence with primary antibodies for K17 and p63, markers for periderm and basal epithelial layer cells, respectively. We sectioned maxillary regions of fetal and newborn palates of both unaffected and affected pups and observed K17 and p63 staining in the superficial and basal epithelial layer cells. Although the cleft in the palate shelf was apparent in affected animals, there was no detectable difference in presence of the epithelial layers in affected versus unaffected pups. In the future, we will measure cell proliferation and apoptosis in the three cell types in the palate shelves in newborns and dog fetuses.

STRATEGIES TO TARGET PANCREATIC CANCER
Lauren Jernstadt
Cell Biology Genetics and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 29
Mentor(s): Kathleen Gallo, Hayden Stoub

Pancreatic ductal adenocarcinoma (PDAC) is one of the most lethal forms of cancer with a 7-8% five year survival rate. Poor prognoses stem from increased resistance to chemotherapies such as Gemcitabine and high rates of metastasis. Mixed lineage kinase 3 (MLK3) is a protein kinase that regulates intracellular signaling pathways. Our lab has shown that MLK3 is required for invasion and metastasis in a breast cancer model in vivo, and inhibition of MLK family signaling

pathways diminishes migration and invasion of human breast cancer in vitro. My project is examining the impact of an MLK inhibitor on pancreatic cancer cells using in vitro models. Specifically, I am assessing the effect of MLK inhibition on viability and signaling of pancreatic cancer cells by western blotting.

RAPID IDENTIFICATION OF GENE KNOCKOUT VIA CRISPR-CAS9-MEDIATED HOMOLOGY-INDEPENDENT TARGETED INTEGRATION
Noelia Barvo
Cell Biology Genetics and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 30
Mentor(s): Masamitsu Kanada

Targeted nucleases edit genes with high efficiency and specificity. The CRISPR-Cas9 system can be exploited to generate rapid knockouts: Cas9 introduces a DNA double-stranded break (DSB) at a specific genomic locus, and non-homologous end joining (NHEJ), an endogenous, error-prone repair mechanism, introduces frame shift mutations which may result in selective silencing of a gene. Unlike RNA interference, CRISPR-Cas9 mediated gene knockdown generates a durable phenotype but also requires single cell isolation, expansion of the clone, and western blotting validation. The site-directed insertion of heterologous genetic material into genomes greatly facilitates the study of gene function for basic science and translational studies. Here we propose a system in which chromosomal knockout cells can be readily identified in culture by monitoring change in fluorescence. Those knockout cells can thus be easily isolated by fluorescence activated cell sorting (FACS) and monitored by fluorescence microscopy. We have demonstrated proof-of-concept by effectively transducing EGFP-expressing NIH3T3 cells with mScarlet (Red Fluorescent Protein); cells in culture are observed to phenotypically switch from producing green light to red. We are currently expressing our system in a human metastatic breast cancer cell line (MDA-MB-231) by targeting the Rab27a and Rab27b loci which play a role in vesicle transport and membrane fusion. A recent study found that overexpression of Rab27a stimulates secretion of pro-invasive exosomes in a subset of melanomas which enhances metastasis in tumor cells. With this system, only in-frame integration will lead to RFP expression and therefore gene knockout cells may be precisely and rapidly identified.

IMPUTATION OF HUMAN GENE EXPRESSION WITH MACHINE LEARNING MODELS
Jake Canfield
Cell Biology Genetics and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 31
Mentor(s): Arjun Krishnan

There have been many gene expression platforms that have been developed with hundreds of thousands of samples measuring approximately twenty thousand genes. Methods for measuring the genes and genes that have a low basal transcription level often result the failure to measure a significant number of genes. Imputing these missing gene's expression is of great importance for increasing the size of the viable data available for other studies as well as studying genes that are challenging to study across different samples. Using machine learning models, the gene expression of as many as ten thousand genes can be imputed across a wide array of different tissues. Here we present several models for imputing missing values of gene expression of ten thousand genes using over one hundred thousand samples with twenty thousand genes.

UNDERSTANDING THE CYCLIC-GMP-AMP DEPENDENT ACTIVATION OF THE VIBRIO CHOLERAE PHOSPHOLIPASE CAPV USING A STRUCTURAL VARIANT
Joe Williams
Cell Biology Genetics and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 32
Mentor(s): Christopher Waters, Geoffrey Severin

Cyclic di-nucleotide (cdN) second messengers are commonly utilized by bacteria to facilitate adaptation to changes in their environment through mechanisms from transcription initiation to allosteric regulation of effector protein activity. The Gram-negative bacteria Vibrio cholerae, the causative agent of cholera diarrheal disease, is a model organism for studying cdN signaling. All strains of V. cholerae causing disease today utilize the recently identified cdN cyclic-GMP-AMP (cGAMP), and thus far only a single effector protein, the phospholipase CapV, has been identified to directly bind and respond to cGAMP. In vivo and in vitro experiments have demonstrated that CapV, is specifically activated by

cGAMP, and this activation can lead to catastrophic degradation of phospholipids from the cell membrane. However, the mechanism by which cGAMP binds and activates CapV remains to be understood. Homology modeling suggests that an unstructured loop, composed of ten amino acids, may occlude phospholipids from entering CapV's active site. We hypothesize that binding cGAMP distorts this loop which then provides phospholipids with access to the active site. To test this hypothesis, we are using Gibson cloning to remove this loop from CapV and we will test whether this variant still requires cGAMP activation by measuring cell viability following ectopic expression in V. cholerae. Through these experiments, we will gain a better understanding of how cGAMP activates CapV as well as elucidate residues and structures which will be useful for the identification of other protein effectors regulated by cGAMP.

EFFECT OF INTERMITTENT FASTING ON RETINAL AND LIVER SIRT1/LXR SIGNALING PATHWAY
Tim Dorweiler
Cell Biology Genetics and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 33
Mentor(s): Julia Busik, Sandra Hammer

Diabetic retinopathy (DR) is a growing health concern, and one of the leading causes of blindness among working age individuals. Clinical trials have shown that dyslipidemia plays a key role in DR progression but the specific molecular mechanisms regulating retinal lipid dysfunction remain under active investigation. Liver X-receptors-α/β (LXR) are major regulators of cholesterol and are downregulated in DR. A major regulator of LXR is SIRT1, which is upregulated during fasting. Previous studies have shown that starvation of retinal cells activates the SIRT1/LXR signaling axis. We hypothesize that fasting induces upregulation of SIRT1 followed by LXR activation leading to an increase retinal cholesterol export genes. Food was removed from C57BL/6J mice before the start of the scotophase, one group was sacrificed at the end of the scotophase and the other group was given food at the start of photophase and sarcrificed at the end photophase. Retinal and liver samples were collected. Retinal SIRT1 ($n=6$; $p<0.0328$) expression levels are increased while liver IL1β levels ($n=6$, $p=0.0130$), a pro-inflammatory marker, are decreased in animals given food after overnight fasting. Although not statistically significant, LXRα and cholesterol export gene, ABCA1 mRNA levels are also increased. Circadian rhythm genes, CLOCK ($n=6$, $p=<0.001$ and Bmal1 $p=0.0067$) increased during the scotophase and decreased in the photophase while Per2 ($n=6$, $p=0.0029$) shows the opposite result. These results suggest that overnight fasting in part modulates SIRT1 retinal expression and results in decreased levels of inflammation. Thus, making the SIRT1/LXR signaling pathway an potential therapeutic target for DR patients.

A BRIGHT RED-SHIFTED BIOLUMINESCENCE REPORTER FOR IN VIVO IMAGING OF EXTRACELLULAR VESICLES
Mia Mcgill
Cell Biology Genetics and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 34
Mentor(s): Masamitsu Kanada

Extracellular vesicles (EVs) are nano-scaled membrane-bound vesicles shed by all cell types in the body. EVs are advantageous over synthetic nanoparticle-based drug delivery systems as they are naturally biocompatible with low immunogenicity. This study aims to create a bioluminescence resonance energy transfer (BRET)-based EV reporter which will enable sensitive *in vivo* optical imaging compared to other protein-based EV reporters. We added a palmitoylation signal to the red enhanced Nano-lantern (PalmReNL) gene in order to anchor the reporter to the cell membrane and thus the EV. The ReNL is comprised of the brightest luciferase, NanoLuc, and tdTomato (red fluorescent protein) as a Forster resonance energy transfer (FRET) acceptor. For *in vivo* imaging, luciferases with emission above 600 nm are preferred, as red-shifted photons escape absorbance by hemoglobin in blood. PalmReNL harnesses FRET to a tdTomato that emits a red-shifted luminescence, enabling enhanced *in vivo* visualization of EVs. In order to validate the cloning, the DNA sequence of PalmReNL was confirmed by Sanger sequencing. Mouse mammary carcinoma 4T1 cells were transfected with the PalmReNL expression vector, followed by the isolation of EVs from the conditioned media. Red-shifted bioluminescence in PalmReNL-EVs was assessed by measuring bioluminescence signals and by fluorescent imaging. Currently, a macrophage cell line, RAW 264.7 stably expressing PalmReNL is being established for *in vivo* imaging. This red-shifted EV reporter will allow for greater sensitivity during *in vivo* imaging, due to its emission spectrum for increased blood and tissue penetration.

TUBES, COILS, BRANCHES: NEW DEVELOPMENTS IN THE MORPHOLOGY OF MURINE UTERINE GLANDS
Sameed Khan
Cell Biology Genetics and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 97
Mentor(s): Ripla Arora

The morphology of murine uterine glands has been characterized as a simple tubular shape. However, recent developments in confocal 3D imaging of the murine uterus shows a marked difference in gland morphogenesis between pregnant and non-pregnant mice, with pregnant mice displaying a more tightly coiled and branched structure reminiscent of human uterine glands. This project details the use of a surfacing image analysis tools to derive a representation of the lumen of a murine uterine gland during gestation and characterize it as a coiled, branched pathway contrary to the simple tubular classification previously established in the literature. Through using a surfacing algorithm as part of the IMARIS image analysis suite, we conclude that the uterine gland lumen of a pregnant mouse is not a simple straight line characteristic of a simple tubular shape, but is complex and displays coiling and branching. Future directions for this project will look at describing changes in uterine gland morphology over the duration of a pregnancy and documenting how gland morphology changes under different hormonal environments in ovariectomized mice.

DIFFERENCES IN EXPRESSION OF AXIN2, PAX9, MSX1 AND BETA-CATENIN BETWEEN INDIVIDUALS WITH CLEFT PALATE AND NORMAL PALATE FORMATION IN A CANINE MODEL
Hunter Hall
Cell Biology Genetics and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 98
Mentor(s): Brian Schutte

Cleft lip and palate is a common developmental birth defect that affects thousands of children each year. The issues of this defect can range from impaired social development and speech to impaired feeding and death. The purpose of this research project is to evaluate the MSU colony of canines, both wild type and cleft, as a model for cleft lip and palate, as well as examining the differences between the mutant and wild type canines in order to determine the genes involved in improper palatal development. Due to the fact that the predominant cell type in the unfused palatal shelves is mesenchymal, it was hypothesized that there is some defect in the biochemical processes of these cells that caused the cleft observed in the population. To determine this the fetal (day 39 post conception) and newborn canines were sectioned and immunofluorescent microscopy is performed to determine the differences between mutant and wild type canines in their expression of various genes suspected to play a role in the formation of a cleft. The antibodies anti for Axin2, Pax9, MSX1 and β-catenin were used to fluorescently mark the cells expressing those genes in the examined canines. Currently, the results from this work has shown no difference in the presence or expression of these cellular proteins in the mesenchymal cells of the palatal shelves in either fetal or newborn canines.

EFFECT OF SERUM STARVATION ON THE SIRT1-LXR SIGNALING PATHWAY IN RETINAL ENDOTHELIAL CELLS
Maximilian Sandler
Cell Biology Genetics and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 99
Mentor(s): Sandra Hammer, Julia Busik, Elahe Crockett-Torabi

Diabetic Retinopathy (DR) is a complication that causes progressive damage to the retina and is the leading cause of vision loss in adults. Chronic inflammation is accepted as a leading cause of DR pathogenesis, however factors leading to inflammatory changes in diabetic retina are not fully understood. Liver X Receptors-α/β (LXR) are well accepted anti-inflammatory regulators. It has been shown that LXR can be activated through deacetylation by nutrient-sensing deacetylase SIRT1. Both SIRT1 and LXR levels are decreased in diabetes. Thus, we hypothesize that serum starvation will increase SIRT1 levels, causing an increase in LXR signaling resulting in decreased retinal inflammation. Bovine Retinal Endothelial cells (BRECs) were isolated and cultured according to published protocols. Cells were treated with pro-inflammatory stimulus, TNFα (10ng/ml) and/or serum starved (0%Fetal Bovine Serum) for 24hrs. mRNA expression levels were analyzed via qRT-PCR. LXR total protein levels were analyzed via western blot analysis. Treatment with TNFα, caused a significant decrease in SIRT1 expression levels (n=6, p=0.0126). Serum starvation for 24hrs caused a significant increase in SIRT1 mRNA levels (n=6, p=0.0031) and LXR protein levels (n=3, p=0.0069). Additionally, treatment with TNFα caused a significant increase in ICAM1 levels (n=6, p<0.001) while serum starvation led to a

significant decrease in inflammation markers including ICAM1 (n=6, p<0.001). TNFα treatment significantly decreased SIRT1 levels and induced inflammation in BRECs. Activation of SIRT1, via serum starvation, lead to decreased levels ICAM1. This data suggests that amplified SIRT1 expression has the potential to reduce DR pathogenesis brought on by retinal inflammatory changes.

EXPRESSION OF CALCIUM REGULATORY GENES IN RECURRENT EXERTIONAL RHABDOMYOLYSIS
Melissa Schott
Cell Biology Genetics and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 100
Mentor(s): Stephanie Valberg

Recurrent exertional rhabdomyolysis (RER) in horses affects females more than males and is characterized by episodes of stiffness, pain and muscle degeneration with exercise. A proposed cause is abnormal regulation of calcium flux across the sarcoplasmic reticulum during muscle contraction. Genes responsible for calcium modulation are the calcium release channel (*RYR1*) and its accessory proteins calsequestrin (*CASQ1*) and calstabin (*FKBP1A*), and the sarcoplasmic reticulum calcium transporting ATPase (SERCA) and its regulatory peptides sarcolipin (*SLN*), myoregulin (*MRLN*) and dwarf open reading frame *(DWORF*). We hypothesized that RER and control horses would have differential expression of these calcium regulatory genes. RNA was isolated from the gluteal muscle of 14 fit RER racehorses (9 female, 5 male; 5.2 ± 2.4 yrs) and 20 fit healthy control (9 female, 11 male; 3.4 ± 1.6 yrs) racehorses. cDNA was synthesized and qRT-PCR was performed to evaluate gene expression. Cycle thresholds for each gene were normalized to GAPDH and analyzed with a 2-way ANOVA and Tukey post-hoc test. While *SLN* was the most highly expressed SERCA regulatory gene, there was no difference in the expression of calcium regulatory genes between control females and control males or between RER females and control females. A sex-by-phenotype effect was identified with lower *CASQ1* expression in RER males *vs.* control males (*P*<0.001) and RER females (*P*=0.05) and higher *FKBP1A* (*P*=0.01) expression in RER males *vs.* control males. In conclusion, RER males have differential gene expression which could reflect adaptations to stabilize calcium release from RYR1 and minimize signs of disease.

THREE-DIMENSIONAL CHARACTERIZATION OF THE EFFECTS OF OVARIAN HORMONES ON UTERINE NERVE DENSITY AND ORGANIZATION
Lindsey Royer
Cell Biology Genetics and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 101
Mentor(s): Ripla Arora

The mammalian female reproductive system is dependent on two main steroid hormones: estrogen (E2) and progesterone (P4). Uterine development, menstrual cycling, and pregnancy are characterized by varying levels of E2 and P4. Female mice have an estrus cycle that mimics the human menstrual cycle, as well as changing levels of E2 and P4. Sympathetic nerve density has been shown to change with the estrus cycle in two-dimensional histological sections. We aim to examine the effects of varying ovarian hormone levels on the three-dimensional neuronal network in the mouse uterus. We will study uteri of female mice during the following: a) pre-pubertal stages, b) different stages of estrus, c) peri-implantation stages of pregnancy, and d) superovulation - where E2 and P4 levels fluctuate as in the clinic during in-vitro fertilization (IVF). We will stain the samples for markers of nerves and epithelial cells, image using confocal microscopy to obtain optical Z slices, and finally perform 3D reconstruction and image analysis on the neuronal architecture. Through this work we will discern differences in nerve density and structure during various stages in uterine development. Furthermore, with the inclusion of the superovulated mice, we will gain insight into changes in neuronal architecture in response to hormones that can affect mechanisms of pregnancy in order to guide more successful results for women undergoing IVF treatments in the clinic.

USING IMAGE ANALYSIS SOFTWARE TO IDENTIFY OBJECTS IN THE 3D MOUSE UTERUS
Jacob Bloom
Cell Biology Genetics and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 102
Mentor(s): Ripla Arora

The mouse is a valuable model system in reproductive and implantation biology in order to understand how embryos and innate objects such as beads travel through the uterine horn and interact with their surrounding environment. The mouse uterus was fluorescently stained using markers of epithelium (E-Cadherin) and uterine glands (FOXA2) and Hoechst to label all nuclei. This allowed us to differentiate between different cell-types when performing confocal imaging. Using image analysis software IMARIS we then identified surfaces and 3D renderings of the uterine epithelium, the glands, the embryos and beads within the uterus to better understand different questions relevant to implantation in the mouse. Using 3D renderings created for the objects (embryos or beads) as well as the uterine lumen, we were successfully able to identify location of these objects along the uterine horn. One limitation of the location analysis tool is that it heavily relies on the quality of immunofluorescence staining of the different cell types as well as embryos in the uterus. This location tool is an effective way to examine embryo implantation sites in different genetic mouse mutants, mice treated with hormones or inhibitors. This tool will also help identify embryo or bead location with respect to each other to understand spacing of objects along the uterine horn, which will allow us to examine the phenomenon of embryo spacing in greater detail.

THE ROLE OF IRE1 IN GLIOBLASTOMA CELL MIGRATION
Shay Ladd
Cell Biology Genetics and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 103
Mentor(s): Christina Chan

The endoplasmic reticulum (ER) is responsible for protein folding, lipid synthesis, and calcium storage. ER stress is a condition caused by an accumulation of unfolded proteins and contributes to the progression of diseases such as cancer. Cellular adaptation to ER stress is achieved through activation of the unfolded protein response (UPR), an integrated signal transduction pathway mediated by ER stress sensor proteins, of which IRE1 is the most conserved and most well studied. The UPR reduces the synthesis of new proteins to relieve ER stress and upregulates genes that promote the ER's ability to deal with the unfolded and misfolded proteins. ER stress arising from environmental factors has resulted in elevated IRE1 activity that has contributed to tumor growth and alter cell migration, transformation, and angiogenesis patterns. Studies in glioma showed a positive correlation between the activity of IRE1 and the levels of proangiogenic factors. However, the specific mechanism by which IRE1 is involved in glioblastoma migration has yet to be investigated. As a first step towards investigation of the involvement of IRE1 in glioblastoma migration, a CRISPR knockout of the IRE1 gene is being generated. A T7 assay is being used to check for editing. Flow cytometry will be performed to sort the transfected cells into single-cell colonies and a western blot will be performed to confirm the knockout of IRE1. Scratch and Borden chamber assays will then be used to measure cell migration, and to determine whether IRE1 mediates cell migration of GBM cells.

EXCLUSION ANALYSIS OF PROGRESSIVE RETINAL ATROPHY CANDIDATE GENES IN BELGIAN TERVURENS AND OLD ENGLISH SHEEPDOGS
Amanda Liddicoat
Cell Biology Genetics and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 187
Mentor(s): Paige Smith, Simon Petersen-Jones

Progressive Retinal Atrophy (PRA) is a group of inherited retinal degenerative diseases reported in over 100 dog breeds. It results in blindness and so far at least 24 PRA-causing mutations in 18 genes have been identified. The specific aim of this project was to investigate PRA candidate genes in two breeds of dog—the Belgian Tervuren (BT, N=5) and Old English Sheepdog (OES, N=3). Our hypothesis is that a different single mutation is responsible for the diagnosed PRA in each breed. We used a previously developed panel of 96 polymorphic microsatellites flanking 48 candidate genes to investigate possible association of PRA in the two breeds with the candidate gene loci. The microsatellite (MS) marker sequences were PCR-amplified, tagged, and sent for high-resolution genotyping. The results were analyzed under the assumption that if a candidate gene held the PRA-causing mutation that the markers for that locus would be in linkage

disequilibrium with the mutation. PRA is recessively inherited in the two breeds meaning affected dogs are homozygous for a mutation in a single gene. We used exclusion analysis to eliminate potential candidate genes in each breed. Under exclusion analysis, potential disease causing loci are eliminated as containing the causal mutation if the affected dogs of the breed display variability for the linked locus markers. Identification of the causal genes for PRA will allow for selective breeding to eliminate the condition from the breed.

SCARLESS CRISPR GENE EDITING OF HUMAN LIPOXYGENASES IN IPSCS FOR THE STUDY OF OXYLIPIN FUNCTION IN CONGENITAL HEART DISEASE
Brian Amburn
Cell Biology Genetics and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 188
Mentor(s): Aitor Aguirre

Congenital heart defects (CHD) are the most common cause of birth defects in humans. Although under high scrutiny for decades, the majority of the underlying causes leading to CHD are unknown. Using liquid chromatography?mass spectrometry (LC-MS) based lipidomics, we have recently discovered a novel family of oxylipins - a class of bioactive lipids with powerful biological activities - that contribute to CHD. To study the molecular mechanism of oxylipin involvement in CHD, we decided to use state-of-the-art scarless CRISPR/Cas9 gene editing to knockout the enzymes Arachidonate 12-Lipoxygenase (ALOX12) and Arachidonate 15-Lipoxygenase (ALOX15) in human pluripotent stem cell lines. These new cell lines can be used to model human cardiovascular development in vitro and study the role of oxylipins and ALOX12/15 on CHD. Non-integrative plasmids containing CRISPR/Cas9, an sgRNA for ALOX12 or ALOX15, and puromycin resistance will be electroporated into iPSCs using the Neon transfection system. Cells carrying the transient plasmid will be selected for with puromycin exposure, yielding scarless ALOX12 and ALOX15 knockout stem cell lines. Knockouts will be plated at low clonal density, and the clones will be selected, grown, and DNA-sequenced for confirmation of the knockout. These cell lines can be used for more in depth studying of CHD and oxylipin interactions, potentially through differentiation of the knockout lines into cardiomyocytes, generation of cardiac organoids, and observation of the resulting phenotypes.

TARGETING MAPK SIGNALING PATHWAYS IN LUNG SQUAMOUS CARCINOMA AS A POTENTIAL THERAPEUTIC APPROACH
Madeleine Batra, Brandon Llewellyn
Cell Biology Genetics and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 189
Mentor(s): Kathleen Gallo

Lung cancer is currently the leading cause of cancer death globally for both men and women. Thus, it is imperative that research be directed towards identifying potential new therapies. The most common type of lung cancer is non-small cell lung cancer (NSCLC). The two major subcategories of NSCLC are adenocarcinoma and squamous cell carcinoma. Adenocarcinoma has a better survival rate than squamous cell carcinoma, in part because of more treatment options. Currently, squamous cell carcinoma primarily relies on cytotoxic chemotherapy and radiation treatment and is responsible for 400,000 deaths worldwide annually. This study investigates the mixed lineage kinase (MLK) subfamily of MAP3Ks, part of the MAPK pathway. The MAPK pathway is important for many cell functions including growth and proliferation. Analysis of genomic data in The Cancer Genome Atlas shows overexpression and/or amplification of MLK family member(s) in 70% of squamous cell lung cancers. To assess whether MLKs are potential targets for future therapies for lung squamous cancers, we are assessing the effects of a pan MLK inhibitor on human lung squamous cancer cells. Our goal is to determine the role of MLKs in MAPK signaling in lung squamous cells and link this to the potential of an MLK inhibitor to affect cell viability and proliferation. In order to assess a pan MLK inhibitor's effect on MAPK signaling, western blotting will be used. To determine the effects of an MLK inhibitor on cell growth and proliferation, viability and proliferation assays will be used.

DISTINGUISHING CLOSELY RELATED RHAGOLETIS (DIPTERA: TEPHRITIDAE) SPECIES USING SANGER SEQUENCES OF 28S RRNA GENES
Joe Dziedziula
Cell Biology Genetics and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 190
Mentor(s): James Smith

The apple maggot fly, Rhagoletis pomonella, is a pest of apples in Michigan and other apple-producing states. In the Pacific northwest, identification of R. pomonella is complicated by the co-occurence of the snowberry fly, R. zephyria, which is essentially indistinguishable morphologically and extremely closely related genetically. In research carried out by LBC students, we discovered that these two species have an apparent difference in the D2-D3 expansion region of their 28S rRNA gene. Initially, we examined this difference across a small sample of flies, and the work described here reports our assay of a broader set of individuals in a number of R. pomonella, R. zephyria and R. mendax populations across the United States. The flies from these populations had their 28S rRNA gene sequenced using Sanger sequencing at the MSU RTSF Genomics Core. The sequences were scored at two places in the alignment of the D2-D3 expansion region. All R. zephyria scored from these additional populations had two thymines from positions 101-103 in the alignment and five adenines from positions 159-163, consistent with the preliminary findings. Also, all R. pomonella individuals scored from additional populations have four adenines from 159-163, and either have two or three adenines from 101-103, which complicates their scoring. Thus, these genetic differences appear to provide the basis for a molecular diagnostic tool to distinguish between the closely related R. pomonella and R. zephyria. Analyses of R. mendax individuals from additional populations are in progress.

SEQUENTIAL RESAMPLING FOR HIDDEN MARKOV MODEL BASED RECOMBINATION HOTSPOT DETECTION
Rei Doko
Cell Biology Genetics and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 191
Mentor(s): Kevin Liu

Sequential resampling is a method for generating random walks on biological sequences. These random walks take advantage of the locality of processes that affect DNA, such as recombination and gene conversion. There are some regions in DNA where recombination occurs at a higher rate called recombination hotspots. We evaluate the performance of sequential resampling with a hidden Markov model based method for inferences on DNA sequences with recombination hotspots.

EFFECT OF THE SUNSCREEN COMPONENT, OXYBENZONE, ON MACROPHAGES THAT SUPPORT MAMMARY TUMORIGENESIS
Jordan Wagner
Cell Biology Genetics and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 192
Mentor(s): Richard Schwartz, Olena Morozova

Oxybenzone (Benzophenone-3, BP-3) is a known endocrine-disrupting chemical, commonly found in sunscreen and many personal care products. Ninety-eight percent of people have BP-3 in their urine. BP-3 has estrogen-like activity that may alter mammary gland development and function and thus may influence mammary tumorigenesis. To understand how BP-3 affects mammary tumorigenesis, we transplanted BALB/c mice with p53 knockout mammary epithelium and fed them diets with or without BP-3 until they were terminated. The dietary regimens varied in fat content and timing of exposure to high levels of saturated animal fat: lifelong low-fat diet (LFD; 10% kcal fat); low-fat diet switched to high-fat diet (60% kcal fat) after puberty (LFD-HFD); and high-fat diet switched to low-fat diet after puberty (HFD-LFD). Mice were palpated weekly for tumors and tumors collected at 1 cm^3 size. Tumors were fixed in formalin and then classified as epithelial (more differentiated and less aggressive) or spindle cell (less differentiated and more aggressive) tumors. The tumors were sectioned and stained with immunofluorescent antibody for CD206, a marker for M2 tumor-promoting macrophages, which may be immunosuppressive or directly promote tumor growth. Images were captured using a Nikon immunofluorescence microscope and analyzed to quantitate CD206-positive macrophages associated with the tumors. Our preliminary data suggests that BP-3 may increase recruitment of M2 macrophages to epithelial tumors, specifically to the tumor edge in mice fed HFD at any life stage. This suggests that BP-3 may promote tumor development by inducing an immunosuppressive or otherwise tumor-promoting environment.

GENERATION OF INDUCIBLE K-RAS-DRIVEN P53-DELETED RAT MODEL FOR CANCER STUDIES
Ryan Nazareno
Cell Biology Genetics and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 193
Mentor(s): Lorenzo Sempere

Mouse models are a common method of in vivo observation and testing for various disorders. Rat models provide an intermediate between mouse and human models into the physiological and molecular aspects of disease and cancer. Using easi-CRISPR methodology, we aimed at transferring the genetic elements of the Cre/LoxP inducible Kras-driven Tp53-deleted mouse model to a rat model. The genetic information of the CD Sprague Dawley rat substrain served as the basis for creating guide RNAs. We designed two long single-stranded DNA to insert a LoxSTOPLox (LSL) cassette G12D point mutation (GTT-> GAT) into the Kras sequence and to insert two LoxP sites flanking exons 5-8 of the Tp53 gene, encoding the DNA binding domain of Tp53 protein. Two separate microinjection experiments were conducted to target the Kras or Tp53 locus with this long ssDNA and other components of the Cas9/CRISPR system. DNA was extracted from potential founder animals and F1 progeny to establish transmission and tested using PCR and gel electrophoresis, to verify the correct integration of the intended transgene. Samples validated with gel imaging were sent for sequencing to confirm the proper sequence and location of the transgene. One Kras line had the correct integration of the LSL cassette, but did not introduce the G12D point mutation (GTT-> GAT). No potential Tp53 founders integrated the transgene. However, we identified a Tp53 line where exons 5-8 were permanently deleted and consequently these animals developed tumors. I will discuss redesigning strategy to obtain the desired targeted Kras and Tp53 transgenes.

CONTROL OF RETINAL CHOLESTEROL LEVELS BY FASTING-INDUCED ACTIVATION OF SIRT1-LXR PATHWAY IN DIABETIC RETINOPATHY
Delaney Mcfarland
Cell Biology Genetics and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 293
Mentor(s): Sandra Hammer, Julia Busik, Elahe Crockett-Torabi

Diabetic retinopathy (DR) is a growing health concern with limited treatment options. Dyslipidemia and dysregulation of cholesterol levels play a significant role in DR development; however, strategies to normalize cholesterol regulation in the retina are lacking. Major regulators of cholesterol metabolism are Liver X-receptors-α/β (LXR). LXR signaling has been shown to activate retinal reverse cholesterol transport (RCT). SIRT1 is activated during fasting and is a major regulator of LXR activity. Both SIRT1 and LXR levels have been shown to be decreased in diabetes. We hypothesize that the fasting-induced increase in SIRT1 followed by LXR deacetylation and activation leads to an increase in RCT and lower cellular cholesterol levels. Bovine retinal endothelial cells (BRECs) were isolated, validated, and treated with diabetic relevant stimuli TNFα (10ng/ml) for 24hrs. In order to model calorie restriction, BRECs were serum starved for 24hrs. ABCA1 and ABCG1 were analyzed via qRT-PCR. Cellular cholesterol concentrations were measured via Amplex Red Cholesterol Assay Kit. Cell viability was measured via trypan blue exclusion assay. Serum starvation increased SIRT1 mRNA levels, as well as LXR-controlled genes ABCA1, and ABCG1 mRNA levels. TNFα treatment increased cholesterol levels, while serum deprivation for 24hrs decreased cholesterol levels in BRECs. There was no significant difference in cell viability among cells cultured in low FBS percentages after 24hrs. The results suggest that serum starvation promotes activation of the SIRT1-LXR pathway. Activation of SIRT1-LXR pathway by fasting could be considered as a strategy for regulating cholesterol levels in the diabetic retina.

GENOTYPIC IDENTIFICATION OF CONGENITAL BILATERAL ABSENCE OF THE VAS DEFERENS THROUGH DIAGNOSIS OF THE R117H MUTATION USING ALLELE SPECIFIC PCR
Nitya Deshpande, Cameron Bennett, Sara Moussa, Ritika Sanikommu
Cell Biology Genetics and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 294
Mentor(s): Douglas Luckie

The p.Arg117H (R117H) mutation is a substitution mutation in which a single nucleotide guanine is replaced by adenine. Amino acid histidine (CAC) is coded for in lieu of arginine (CGC) at the 117th amino acid position (Yu et al, 2016). R117H is a class 4 mutation which causes the CFTR protein to misfold and malfunction (Thauvin-Robinet et al, 2013). When this occurs, it leads to Congenital Bilateral Absence of the Vas Deferens (CBAVD) in males. In 97-98% of males who have Cystic Fibrosis, CBAVD is also present (Lewis-Jones et al, 2000). The purpose of the study was to diagnose the mutation on the CFTR gene that is responsible for CBAVD using an allele specific polymerase chain reaction based diagnostic assay. PCR allows a segment of target DNA to be amplified and aid in the diagnosis of disease (Louie et al, 2000). Our hypothesis was that by designing primers with an intentional mismatch near the mutation site, the mutant genotype would be more accurately diagnosed as the incidence of nonspecific annealing would be reduced. We predicted that the designed primers would bind to wild-type and mutant DNA extracted from human buccal cells of CF positive and negative individuals and would be visualized as a 1,673 base pair band (Richards et al, 1993). Gel electrophoresis was used to analyze the results of the PCR assay and demonstrated a band length of 1,673 bp due to the respective forward and reverse primer locations at 51,161 and 52,834 base pairs.

EFFECTS OF BACTERIALLY-DERIVED SHORT CHAIN FATTY ACIDS ON HUMAN COLONIC EPITHELIAL CELLS
Kennedy Sawicki
Cell Biology Genetics and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 295
Mentor(s): Gavin Stewart

Bacterially derived short chain fatty acids (SCFAs), such as butyrate, in the gastrointestinal tract are important in maintaining human health. The transport of these metabolites across colonic epithelial cells through monocarboxylate transporter 1 (MCT1) is an important part in the maintenance of health. Previous research has used Caco-2 and HT-29 epithelial cells as models for the transport of these SCFAs across colonic epithelial cells. The goal of this project was to determine if HCT-8 cells are a better model to use going forward. Through Western Blotting with various antibodies and End-Point PCR, it was determined that HCT-8 cells act more like cancer cells rather than normal cells. This is because in the butyrate treated samples for most cases, there was a decrease in the product, meaning that this cell line is effected by butyrate in a negative way, as has been shown with cancer cells. Cancer cells use MCTs as lactate transporters rather than SCFA transporters and so there is a decrease in MCT1 along with a decrease in the other gene products that are involved in this process. While HCT-8 cells have been shown to be cancer cell models, they are not as good of a model for cancer cells as the HT-29 cells are, as seen in previous research. Going forward, more colonic epithelial cell lines need to be tested in order to find the best model for a normal cell and the best model for a cancer cell.

DEVELOPMENT OF A MULTIPLEXED TETRASTR PANEL FOR GENETIC STUDIES IN ZEBRAFISH
Anthony Nguyen
Cell Biology Genetics and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 296
Mentor(s): Patrick Venta

Zebrafish have become an increasingly important model for human disease and genetic research. Several hundred million dollars have been invested in zebrafish research in 2018 alone. Part of the reason for its increasing importance is its transparent body during early development and its surprising similarity to human gene content. Unfortunately, almost no inbred lines exist for this important species. Part of the reason for this is likely to be due to the lack of good, inexpensive genetic markers to develop inbred lines. We hypothesized that it would be possible to develop a multiplexed panel of tetranucleotide simple tandem repeats for the zebrafish using an approach previously used by this lab to develop similar panels for species as widely diverged as horses, jaguars, and honey bees. TetraSTRs were selected from the zebrafish reference genome based upon DNA sequence alignment scores with perfect tetraSTRs. After rejecting those markers that were flanked by transposable element repeats, primers were designed to be multiplexed using Primer3 in a way that places AA at the 3′ end of all primers, which reduces the problem of primer-dimer formation

and minimizes stutter artifacts. Fifteen primers sets were divided into 3 sets of 4-plexes and 1 set of a 3-plex, with the split based on size. These primers produced excellent amplifications in these multiplexes with good variability among zebrafish strains, thus supporting the hypothesis. These primer sets will eventually be combined into one 15-plex which can then be used to aid in the development of inbred lines of zebrafish.

POSITIVE ALLOMETRIC SCALING OF CELL SIZE AND FITNESS IN A LONG-TERM EVOLUTION EXPERIMENT WITH ESCHERICHIA COLI
Ali Abdelmagid
Cell Biology Genetics and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 297
Mentor(s): Nkrumah Grant

In a long-term evolution experiment (LTEE) with *Escherichia coli*, 12 populations started from the same ancestor have evolved alongside each other in a common environment for greater than 69,000 generations, or 30 years. During these 30 years, lab members have measured fitness in that environment, which was found to be continuously increasing. Previous work showed that cell size also increased, through 10,000 generations, contrary to what might have been predicted given considerations about surface-to-volume ratios and resource uptake. In this project, we set out to determine if cell size had continued to increase with fitness after 10,000 generations. To this end, we revived frozen samples of bacteria from the 12 LTEE populations isolated from 2,000, 10,000 and 50,000 generations, and measured cell size using volumetric and microscopic methods. Our results clearly show cell size to have increased between ancestor and evolved clones through 50,000 generations. However, there does not seem to be a relationship whereby cell size consistently increased in all populations between 10,000 and 50,000 generations. Furthermore, we also observed that some populations form coccoidal cells atypical of the rod-shape that defines *E. coli* as a species. Understanding the relationship between cell size and fitness will further inform the theory relating cell size to complexity within biological systems. Furthermore, this study contributes to an increase in knowledge of evolutionary dynamics including its repeatability.

HEART RATE VARIABILITY AND GASTRIC RHYTHM AS SYMPTOM INDICATORS IN PEDIATRIC ORTHOSTATIC INTOLERANCE
Abi Otwell
Cell Biology Genetics and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 298
Mentor(s): John Fortunato, Sally Tarbell

Pediatric patients with orthostatic intolerance (OI) often report symptoms of dizziness, abdominal pain, lightheadedness, and nausea. Not only are the underlying mechanisms of these symptoms fundamentally complex and poorly understood, but self-reported scores for these visceral sensations are too subjective to be quantitatively evaluated. Thus, we wanted to see whether correlations exist between symptom scores and two objective parameters: heart rate variability (HRV) and gastric rhythm (GR). We hypothesized that low HRV and abnormal GR would be associated with onset of symptoms. To investigate this, I analyzed data from Head Upright Tilt Tests and conducted correlations that revealed some evidence to support our hypothesis. As a result, we concluded that HRV and GR may serve as symptom biomarkers in patients with pediatric OI.

CHARACTERIZATION AND ANALYSIS OF NONVIRAL GENE DELIVERY VECTORS
Kevin Pezeshkian
Cell Biology Genetics and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 299
Mentor(s): Carl Boehlert, Per Askeland

Gene therapy is an exciting field in its infancy; interest had spiked in the late 1990s. There are multifarious research and clinical applications of gene transfer; they offer a promising approach to cancer, genetic disease, and neurological disease therapy. Effective gene delivery vectors are critical in therapeutic applications of gene therapy; the vector must balance cytotoxicity and effective nucleic acid delivery. Finding appropriate vectors pose substantial limitations in clinical applications. In this study, we focus on non-viral vectors. In order to analyze the characteristics of nonviral vector materials, scanning electron microscopy (SEM) was employed to examine their microstructure, and literature review was performed for identifying their favorable properties and applications. This study solely focuses on the materials used for

nucleic acid delivery. SEM analysis was conducted on Multi-Walled Carbon Nanotubes (MWCNT) and Polyethylenimine (PEI). The goal of this study is to determine the beneficial attributes of the nonviral vectors and theorize the benefits and limitations of these materials.

IDENTIFICATION OF CAUSES OF NON-MALARIAL FEVERS USING TAQMAN QPCR ON BLOOD SAMPLES FROM SUBURBAN ZINGWANGWA
Nicole Gross
Cell Biology Genetics and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 300
Mentor(s): Karl Seydel

Introduction: Malaria prevalence has decreased across Africa, but the prevalence of fevers has remained high. Malaria negative diagnostic tests leave clinicians with little information and few therapeutic options. Diagnostic TaqMan PCR assays for *Borrelia* spp., *Rickettsia* spp., *Salmonella* enterica, *Trypanosoma* brucei, *Leptospira* spp., and *Brucella* spp. have been optimized according to previously published literature. These pathogens were chosen due to their presence in sub-Saharan Africa. Methods: Peripheral blood from 180 children between ages 6 and 60 months from suburban Zingwangwa was preserved on filter papers. These children were divided into 3 clinical groups: healthy controls, non-malarial fevers, and malarial children as diagnosed by rapid diagnostic tests. DNA from dried blood spots was isolated using the Qiagen technique. This DNA was analyzed for each pathogen using TaqMan PCR assays in order to determine positive samples. Results: There was no amplification in the 54 blood samples for any pathogen. Conclusion: The pathogens chosen were not a good panel for multiplex based on the Zingwangwa samples. Other possible relevant pathogens include *Streptococcus* pneumoniae, *Staphylococcus* aureus, and *Mycobacterium* tuberculosis. Eventually a multiplex panel of pathogens specific to Malawi will be developed to aid clinicians in identification of the sources of non-malarial fever.

USING PROSTAGLANDIN SYNTHASE INHIBITORS TO UNDERSTAND THE MECHANISMS OF EMBRYO SPACING
Savannah Wright
Cell Biology Genetics and Genomics, Oral Presentation
Section: 5, 8:30 AM, Lake Michigan Room
Presentation Number: 651
Mentor(s): Ripla Arora

A pregnancy with more than one fetus in humans is characterized by complications including preterm labor, low birth weight, intra uterine growth restriction, preeclampsia and fetal loss. In the mouse model of pregnancy, embryo crowding causes clustering of embryos leading to competition for resources and often resorption of embryos mimicking human phenotypes for a multiple pregnancy. Prostaglandins play an essential role in establishment of pregnancy and disrupting their function causes poor embryo attachment and embryo spacing defects. In order to assess the mechanisms of embryo spacing we used mice in which prostaglandin synthesis is disrupted using indomethacin - an inhibitor of cyclooxygenase activity of the prostaglandin synthase enzymes. We observed that seven of the eighteen uterine horns treated with indomethacin had no embryos at the time of embryo attachment. In eleven out of eighteen horns, we observed uneven embryo spacing and of these eleven horns, two had embryos clustered closer to the cervix. Prior research from our lab has shown that embryos move uni-directionally towards the cervix and then space out evenly by bi-directional movement. Since indomethacin caused clustering of embryos near the cervix that suggests involvement of prostaglandin signaling in bidirectional movement of embryos. When indomethacin treated mice were analyzed at day 7 of pregnancy, we observed smaller deciduae with less vasculature as compared to control mice indicating poor prognosis of pregnancy. Our data indicates that indomethacin does not affect embryo number but disrupts bidirectional movement of the embryos leading to poor decidualization and embryo spacing defects.

ESTROGEN RECEPTORS EXPRESSION IN RETINAL MÜLLER CELLS, A POTENTIAL MECHANISM FOR THE NEUROPROTECTIVE EFFECTS OF ESTROGEN
Hailey Sheldon
Cell Biology Genetics and Genomics, Oral Presentation
Section: 5, 8:45 AM, Lake Michigan Room
Presentation Number: 652
Mentor(s): Susanne Mohr

Diabetic retinopathy is a major complication of diabetes. It has been speculated that diabetes causes retinal inflammation which affects function and viability of retinal cells such as Müller cells, a prominent glia cell type that protects retinal neurons as well as its vasculature. Recent reports suggest that estrogen can suppress inflammation although this has never been tested in the context of chronic inflammation and retinal diseases. Although we have previously shown that Müller cells are able to produce estrogen, but how estrogen is mediating its neuroprotective function is unknown. Therefore, this study was focused on understanding expression patterns of estrogen receptors in Müller cells when challenged with hyperglycemic conditions. Retinal Müller cells (MC) were cultured in 5mM and 25mM glucose in the presence or absence of β-Estradiol (10nM). Expression of estrogen receptors (ERα) and (ERβ) were determined using Western Blot technique. Our results show that ER? was expressed at equal levels in both, normal and hyperglycemic conditions. However, high glucose conditions decreased expression of ER? by 43.8±25% compared to normal. Treatment with estrogen (10nM) lowered expression levels of ERb by 50±6.2 under normal conditions. Under high glucose conditions, ERb levels were barely detectable following estrogen treatment. The results indicate that ERb but not ERa is the estrogen sensitive receptor on Müller cells potentially mediating the neuroprotective effects of estrogen. This data will encourage (1) looking deeper into relationship of sex and diabetic retinopathy and (2) identifying new anti-inflammatory pathways mediated by estrogen in the diabetic retina.

IDENTIFYING CELLULAR MECHANISMS FOR THE SKELETAL BENEFITS OF SFX-01
Daniel Seong
Cell Biology Genetics and Genomics, Oral Presentation
Section: 5, 9:00 AM, Lake Michigan Room
Presentation Number: 653
Mentor(s): Anne Slavin

Osteoarthritis (OA) is a joint disease that stems from the breakdown of joint cartilage and underlying bone tissue. OA patients typically demonstrate enhanced bone resorption. While treatment options for OA have not been fully developed, antioxidants have been proven to be effective in alleviating the disease. Sulforadex (SFX-01) is a synthetic compound that is a stabilized version of sulforaphane. Under the hypothesis that SFX-01 limits bone resorption through the Nrf2 pathway, it was explored whether in vitro osteoclast (OC) formation is linked with the bone mass in mice and whether Nrf2, the downstream target of the drug, regulates OC formation and resorption. Results from cell culture with 6 to 8 week old CBA and C57BL/6 (BL6) mice in the presence of SFX-01, Trig (Nrf2 inhibitor), or Ra839 (Nrf2 activator) suggested that SFX-01 limits bone resorption through the Nrf2 pathway. It was also concluded that in vitro osteoclast formation and bone resorption is linked with mouse bone mass. The CBA mice with a higher bone mass phenotype had significantly lower OC number and resorption than the BL6 mice. When 10 mM concentration of Ra839 was added in cell culture, there was a significant decrease in OC number with no significant change in resorption. The addition of Trig in cell culture had no significant impact on OC number or resorption.

AMPLIFICATION OF DELTA-F508 MUTATION IN CFTR GENE IN HOMO SAPIENS USING ALLELE SPECIFIC PCR AND GEL ELECTROPHORESIS
Abby Struble
Cell Biology Genetics and Genomics, Oral Presentation
Section: 5, 9:15 AM, Lake Michigan Room
Presentation Number: 654
Mentor(s): Douglas Luckie

The cystic fibrosis △F508 mutation is found in approximately 70% of patients diagnosed with the disease. On the long arm of chromosome 7, when CTT is deleted at the 508th codon, phenylalanine is lost, creating misfolded CFTR proteins quickly eliminated by chaperones. The purpose of our project was to design a diagnostic assay that could quickly detect the presence of △F508-CFTR via the use of PCR and gel electrophoresis. We hypothesized that primers designed using the Yaku et al 2008 method might anneal better to the template DNA even with a three base deletion due to an additional intentional mismatch placed on the 3′ end. After analyzing wild-type and mutant DNA sequences of the CFTR gene, we designed a set of wild-type and mutant seeking primers that would anneal to generate bands of 538 base pairs

in length at 48ºC annealing temperature. The current status of our ongoing experiments will be presented at the research forum. In addition to the PCR studies, we also pursued a psychological/sociological experiment and will report findings from an analysis of frequency and psychological impact of repeated hand washing and sanitizing for the individuals in simulated living settings performing daily tasks of patients with cystic fibrosis.

PCR ASSAY TO DETECT F508DEL MUTATION ON THE CFTR GENE
Emma Bush
Cell Biology Genetics and Genomics, Oral Presentation
Section: 5, 9:30 AM, Lake Michigan Room
Presentation Number: 655
Mentor(s): Douglas Luckie

Cystic fibrosis (CF) is an autosomal recessive disease that is caused by a mutation in the Cystic Fibrosis Transmembrane Conductor (CFTR) gene. A common mutation of CFTR is the deletion of phenylalanine at position 508 in the CFTR gene (△F508), which affects 71% of those with CF (Kerem et. al, 1990, pg. 1) The △F508 protein is misfolded, and early degradation of the protein occurs before it reaches the apical membrane. The purpose of this research was to create a PCR assay to identify △F508 mutation. This included the purifying wild-type and ?F508 DNA using Chelex-100, performing PCR, and utilizing agarose gel electrophoresis with 1kb or 100 bp ladder as reference for the experimental data. Published mutant seeking primers and wild type primers were used as a control test, and custom mutant seeking and wild type primers were also designed. The published mutant primer had a sense strand of 5′GCCTGGCACCATTAAAGAAAATATCATTG3′. The published wild type seeking primer had a sense strand of 5′GCCTGGCACCATTAAAGAAAATATCATCT3′. The mutant and wild type DNA had a common published antisense primer of 5′GGGTAGTGTGAAGGGTTCATATGCATAAT3′. The annealing temperature was 59°C. After PCR on the △F508 mutant and wild type DNA was complete, it was run through a gel electrophoresis test, and were predicted to be 149 bp long. The custom wild type antisense primer was 5′CATCATAGGAAACACCAAAG3′ and custom mutant seeking antisense primer was 5′CATCATAGGAAACACCAATG3′. The common sense primer was 5′CCTTCTACTCAGTTTTAGTC3′. The annealing temperature was 47.7°C. After gel electrophoresis, the amplified regions were predicted to be 989 base pairs long.

CHARACTERIZING MMTV MYC AND E2F5 CONDITIONAL KNOCKOUT MOUSE MODEL OF BREAST CANCER
Caleb Dulak
Cell Biology Genetics and Genomics, Oral Presentation
Section: 5, 9:45 AM, Lake Michigan Room
Presentation Number: 656
Mentor(s): Eran Andrechek

Breast cancer is the second leading cause of cancer death among women. With recent research, patient prognosis is constantly improving. This is partially due to findings characterizing the genetic mechanisms of cancer, leading to more effective treatments. One gene causing breast cancer without an effective treatment is the Myc oncogene. Overexpression of Myc in a mouse model results in mammary tumors after roughly 6 months[1]. Additionally, previous studies using bioinformatics and molecular techniques have demonstrated the importance of the E2F transcription factor family in tumor development in the MMTV Myc mouse model. Specifically, loss of E2F1 or E2F2 leads to increased tumor metastasis in the MMTV Myc model[1, 2]. Although the roles of the transcriptional activators E2F1 and E2F2 have been well studied, the role of the transcriptional repressor E2F5 is poorly understood. Given that E2F5 knockout forms spontaneous mammary tumors and metastasis, I hypothesize that the loss of E2F5 along with Myc amplification in mice will result in decreased tumor latency and increased tumor metastasis. Initial histological analysis indicates increased lung metastasis in the Myc amplification and E2F5 knockout strain. To further characterize this mouse model, we will evaluate apoptotic activity in mammary tumors. We will observe for differences in tumor latency and tumor growth rate. The purpose of this study is to further understand the mechanisms of E2F5 and Myc in human breast cancer, possibly leading to the identification of new therapeutic targets.

THE EFFECTS OF GALACTOSEMIA ON CASPASE-1 ACTIVATION IN RETINAL TISSUE
Brett Trombley
Cell Biology Genetics and Genomics, Oral Presentation
Section: 6, 1:30 PM, Lake Michigan Room
Presentation Number: 661
Mentor(s): Susanne Mohr

Previously, we have shown that the pro-inflammatory caspase-1 (cas-1)/interleukin-1β (IL-1β) signaling pathway is activated in the retina of galactosemic mice, a mouse model leading to similar retinal pathology than the one observed in diabetic retinopathy. Therefore, this study was focused on identifying the effect of galactosemia on cas-1 activation and subsequent retinal pathology in vitro and in vivo. Wild type mice (C57BL/6), cas-1-/-, and IL-1R1-/- mice were fed a normal or 30% galactose enriched diet. Formation of acellular capillaries was determined (number/mm2 retina) to access retinal pathology at 8 months of galactosemia. A rat Müller cell line (rMC-1) was treated with either 5mM glucose or 5mM glucose + 20 mM galactose in the presence or absence of a caspase-1 inhibitor (YVAD-fmk) for up to 72 hours. Cas-1 activity was measured using the fluorescent probe (YVAD-AFC). Galactosemia significantly increased cas-1 activity in retinal tissue by 14±3.8% (compared to normal) at 2 months and by 6.2±3.7% at 4 months duration of galactosemia, respectively. Knock down of cas-1 (6.51±1.27 acellular capillaries/mm2) or the IL-1R1 (4.79±3.34 acellular capillaries/mm2) receptor prevented galactosemia-induced retinal pathology (11.72±4.41 acellular capillaries/mm2). Treatment of Müller cells with high galactose significantly induced cas-1 activation by 21.45±9.15% and cell death (47.95±12.13%; normal: 25.35±6.56%). Inhibition of cas-1 activity prevented galactosemia-induced Müller cell death (33.13±6.87%). Our data show that galactosemiainduced retinal pathology is dependent on activation of the caspase-1 signaling pathway making the caspase-1/IL-1β pathway a common pathway leading to retinal pathology associated with diabetic retinopathy.

REDUCING FALSE POSITIVE RESULTS OF G551D-CFTR MUTATION USING THREE PRIMER CONFIRMATION AND PME1 RESTRICTION ENZYME
Matthew Cederman
Cell Biology Genetics and Genomics, Oral Presentation
Section: 6, 1:45 PM, Lake Michigan Room
Presentation Number: 662
Mentor(s): Douglas Luckie

The G551D mutation of the Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) gene accounts for 4-5% of individuals with Cystic Fibrosis (CF) world-wide that carry at least one mutated CFTR gene (Bonnie et al., 2011). G551D is a point mutation that is located on the 551st codon of the CFTR gene. This mutation alters the encoded amino acid from GGT (glycine) to GAT (aspartic acid). Polymerase Chain Reaction (PCR) was used to determine whether G551D mutation was present within DNA samples. A series of confirmation trials were implemented to ensure correct amplification of the targeted genomic sequence, including a third forward primer and the Pme1 restriction endonuclease from New England Biolabs. We predicted that by incorporating a third primer in tandem with Pme1 as secondary confirmations, our PCR will more accurately detect the G551D missense mutation of the CFTR gene, resulting in DNA amplification bands of determined band lengths through gel electrophoresis (Kai et al., 1991). The broadly amplified DNA segment, 882 base pairs in length, thus was further evaluated by the use of a third primer confirmation yielding a band 492 base pairs in length. Inclusion of Pme1 in three different trails, either in tandem with or following the third primer or implemented independently, will yield bands that would decrease the chance of any potential false positive signal for the presence of the G551D-CFTR mutation. Through the development of this more specific conformational PCR assay, doctors and genetic researchers can more accurately screen and diagnose for the G551D CFTR mutation.

GENOTYPIC IDENTIFICATION OF CF PATIENTS WITH THE R117H MUTATION OF CFTR USING BUCCAL CELL DNA AND ALLELE SPECIFIC PCR
Cameron Bennett
Cell Biology Genetics and Genomics, Oral Presentation
Section: 6, 2:00 PM, Lake Michigan Room
Presentation Number: 663
Mentor(s): Douglas Luckie

Located in the fourth exon of the CFTR gene, the p.Arg117H (R117H) mutation is a single nucleotide polymorphism in which histidine (CAC) is coded for instead of arginine (CGC) at the 117th amino acid position (Yu et al, 2016). R117H is a class 4 mutation that causes the CFTR protein to misfold and malfunction (Thauvin-Robinet et al, 2013). R117H is the cause of Congenital Bilateral Absence of the Vas Deferens in males, with CBAVD present in 97-98% of males who have

Cystic Fibrosis (Lewis-Jones et al, 2000). The purpose of this study was to diagnose the R117H mutation on the CFTR gene that causes CBAVD using an allele-specific polymerase chain reaction-based diagnostic assay. Our hypothesis was that by designing primers with an intentional mismatch near the mutation site using the Yako et al 2008 method, the mutant genotype would be more accurately diagnosed as the incidence of nonspecific annealing would be reduced. We predicted that the designed primers would bind to wild-type and mutant DNA extracted from human buccal cells of CF positive and negative individuals and would be visualized as a 1,673 base pair band (Richards et al, 1993). Gel electrophoresis was used to analyze the results of the PCR assay and demonstrated a band length of 1,673 bp due to the respective forward and reverse primer locations at 51,161 and 52,834 base pairs.

DIAPAUSE: A TOOL FOR UNDERSTANDING UTERINE STRUCTURE-BASED MECHANISMS OF EMBRYO MOVEMENT DURING IMPLANTATION
Zachary Raider
Cell Biology Genetics and Genomics, Oral Presentation
Section: 6, 2:15 PM, Lake Michigan Room
Presentation Number: 664
Mentor(s): Ripla Arora

Many women suffer from unexplained infertility and recurrent pregnancy loss. Much of the deficiencies in their medical intervention results from sparse knowledge regarding mechanisms of embryo movement in the uterus. To better understand how embryos find the right place for attachment, we make use of a paused fertility phenomenon in mice called Diapause - where development of the embryo is halted for two days. Prior research from our lab shows that embryos move bi-directionally to achieve even spacing. During mouse diapause, we isolated uteri at different times and 3-dimensionally imaged and analyzed them, to answer two questions a) Does absence of estrogen during diapause affect bidirectional movement of the embryo? and b) where is the embryo and what is the structure of uterine glands? We used an artificial model of diapause—where ovaries, the source of estrogen was removed, or a natural model of diapause where suckling pups prevent the surge of estrogen. In both these models, embryo spacing was observed and we concluded that estrogen is not required for bidirectional movement. The uterus has glands surrounding its anti-mesometrial pole and when implantation occurs, the glands are reoriented towards the attached embryo. However, it is not known if the glands reorient first or the embryos arrive at their implantation spot first. It is also unknown if placental scars from the previous pregnancy affect embryo implantation in the subsequent pregnancy? We are using natural diapause uteri to address these questions to better understand the relationship between embryo location and gland structure.

IDENTIFICATION AND REGULATION OF SGLT-2 ON HUMAN MÜLLER CELLS BY HYPERGLYCEMIA
Alissa Kainrath
Cell Biology Genetics and Genomics, Oral Presentation
Section: 6, 2:30 PM, Lake Michigan Room
Presentation Number: 665
Mentor(s): Brandon Coughlin, Susanne Mohr

Diabetic retinopathy is one of the major complications of diabetes. Over time, hyperglycemia causes leaky blood vessels in the retina and fluid accumulation in the macula, called macular edema. Both events will eventually lead to blindness. Müller cells, a specific retinal glia type, span the entire retina and are the only other cell type besides the photoreceptors that are present in the macula. Therefore, it is reasonable to believe that Müller cells play an important role in the development of diabetic retinopathy. This study specifically focused on looking at SGLT-2, a sodium glucose cotransporter potentially involved in fluid regulation, on human Müller cells (HMC). HMCs were cultured in 5mM (normal) and 25mM (high) glucose environments in the presence or absence of 2ng/mL interleukin-1β (IL-1β) or 10ng/mL vascular endothelial growth factor A (VEGF-A). Following treatment, the expression of SGLT-2 was determined using Western Blot analysis. The expression of SGLT-2 decreased from 0.057±0.023 (SGLT2:β-actin; AU) under normal glucose conditions to 0.039±0.209 (SGLT2:β-actin; AU) when cultured under high glucose conditions. Additionally, when treated with iL-1 β, SGLT-2 increased from 0.075±0.003 (SGLT2:β-actin; AU) under normal glucose conditions to 0.095±0.036 (SGLT2:β-actin; AU) under high conditions. Furthermore, VEGF-A led to a decrease of SGLT-2 from 0.37±0.12 (SGLT2:β-actin; AU) under normal conditions to 0.028±0.004 (SGLT2:β-actin; AU) under high conditions. Understanding the role of SGLT-2 on Müller cells could help to develop new therapies for preventing and treating diabetic retinopathy.

G551D-CFTR MUTATION DETECTION ASSAY
Maggie Leff
Cell Biology Genetics and Genomics, Oral Presentation
Section: 6, 2:45 PM, Lake Michigan Room
Presentation Number: 666
Mentor(s): Douglas Luckie

Cystic fibrosis (CF) is the most common fatal genetic disease in the United States with an incidence of 1 in 2,500 and a carrier rate of 1 in 20 chromosomes. When the gene was discovered in 1989, it was named the cystic fibrosis transmembrane conductance regulator (CFTR) for its ability to regulate ion transport. The G551D mutation of the CFTR gene is a class III mutation found in 4-5% of people affected by CF. The purpose of this study was to design an assay to diagnose the presence of the G551D-CFTR mutation. Polymerase chain reaction (PCR) was used to determine if samples of DNA had the G551D mutation. To avoid pseudopositive results, a set of three primers were designed to detect this SNP using a strategy developed by Hidenobu Yaku. This method uses the placement of intentional mismatches to complementary bases at the 3′ end of primers to increase specificity and avoid false positives. The amplified DNA segments were evaluated through the use of agarose gel electrophoresis to examine for the presence of a single band of 882 base pairs followed by secondary confirmation via either a nested primer or restriction analysis.

COMMUNICATION ARTS & SCIENCES

IMPACT OF SENTENCE LENGTH ON LIP CONTACT PRESSURE IN PEOPLE WITH PARKINSON'S DISEASE
Alyssa Fritz, Clare Slack, Jocelyn Moraw, Cayce Warman
Communication Arts and Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 42
Mentor(s): Jeffrey Searl, Cayce Warman

Parkinson's disease (PD) results in speech changes (dysarthria) in up to 90% of individuals with the condition. With PD, downscaling of movements happens in the body but less is known of the lips, tongue and jaw. An earlier study indicated people with PD say "p", "b" and "m" with less articulatory contact pressure (ACP) than people without PD suggesting downscaling of speech movements. The current study assessed whether sentence length influences ACP in people with PD. Five people with PD read short (6-syllables) or long (17-20 syllables) sentences with bilabials embedded. Each was read 10 times with a sensor on the lips to detect ACP. Mean ACP for each bilabial was calculated for each sentence length for each person. Because group size is small, primary presentation of results is done descriptively. Per participant, means, standard deviations, and coefficients of variation per bilabial phoneme will be computed for each sentence length. Data will be presented in figures plotting means and variance by sentence length per person to look for ACP trends. Direction of change in ACP within a speaker will be assessed by applying a signed rank test. Additional participants will be needed to draw stronger conclusions. However, understanding the extent to which ACP in people with PD is influenced by the length of the speech stimuli can advance understanding of how the articulators change activity in different speech contexts. This could be helpful in planning clinical assessment protocols sensitive to articulatory deficits in people with PD.

RELIABILITY OF VIDEOFLUOROSCOPIC SWALLOW STUDY RATINGS BETWEEN AND WITHIN SLP GRADUATE STUDENTS AND PRACTICING CLINICIANS
Cassie Feira, Kate Shabet, Madeline Brender
Communication Arts and Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 43
Mentor(s): Jeffrey Searl

Dysphagia is difficulty swallowing that results from a stroke, head injury, aging or other conditions. A Videofluoroscopic Swallow Study (VFSS) is an instrumental evaluation to determine the presence, characteristics, and severity of dysphagia. VFSS is a radiology procedure involving videotaping a person swallowing barium materials that is then reviewed by a speech-language pathologist (SLP). The research literature indicates that inter-judge reliability for VFSS ratings is suboptimal considering the seriousness of decisions made based on the test. The purpose of this study was to assess the reliability of VFSS judgements from SLP graduate students and practicing clinicians, and compare the reliability across the two groups for three VFSS that differ in terms of dysphagia severity. Fourteen students and fourteen clinicians assessed the severity of fifteen physiological parameters for the three VFSS exams. Within group

reliability was calculated (intraclass correlations and 95% confidence intervals (CI)) per group and VFSS exam. Extent of overlap in CIs is descriptively presented to identify differences in judgement reliability as a function of rater group. Understanding differences in rating reliability within and between groups will provide insights that may help shape training approaches for students and new SLPs learning to complete VFSS.

THE EFFECTS OF PROXIMITY OF SLOWED PRIOR SPEECH CONTEXT ON FUNCTION WORD PERCEPTION
Joshua Zhao, Elizabeth Remy
Communication Arts and Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 44
Mentor(s): Laura Dilley

Dilley and Pitt (2010) demonstrated that slowed rate of speech within a contextual frame could decrease the likelihood that listeners perceive a co-articulated function word within a "target region" relative to a normal rate context. This is called the lexical rate effect (LRE). However, there is uncertainty over whether the quantity or the proximity of the slowed speech context is driving the effect. Two experiments examined how varying which syllables were slowed before the co-articulated function word in the target region would parametrically affect function word perception. The preceding context was divided into three regions. The first region included the preceding context excluding two syllables before the target region. The second region included the 2nd syllable before the target region. The third region included the syllable before the target region. Both experiments had a condition slowing the entire preceding context and a condition with the normal rate. Experiment 1 slowed the first region in one condition and the first and second region in another condition. Experiment 2 slowed the second region in one condition and the second and third region in another condition. This allows us to disentangle the question of quantity of slowed audio from proximity of slowed audio. The comparison between these experiments informs theories of how lexical and phonetic perception rely upon speech rate.

RELIABILITY OF LENA IN IDENTIFICATION OF CHILD VOCALIZATIONS IN NATURALISTIC ENVIRONMENTS
Ellen Brooks, Alexis Yang, Kayli Silverstein, Nikki Losievski
Communication Arts and Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 45
Mentor(s): Meisam Khalilarjmandi, Laura Dilley

Different factors of early auditory environments play a critical role in language development in both children with normal and impaired hearing. These factors are especially important for children with cochlear implants. Language development can be assessed by quantifying child vocalizations. This metric indicates how much the child is attempting to communicate, directly correlating to language acquisition. LENA (Language Environment Analysis), a device worn by the infants with cochlear implants, attempts to analyze vocalization information. With LENA, researchers are able to: (1) grasp how much a child communicates with surrounding individuals and (2) receive insight into expressive language development. Child vocalization is one of the powerful metrics. However, the reliability of LENA's other analyzations, such as maternal infant-directed speech, was shown to be misclassified 14% of the time. Errors in one of LENA's automated classifications can impact the accuracy of other measures, such as the number of conversational turns. In this study, human coders manually identify child vocalizations in short intervals of audio for comparison with LENA. Our results pertain heavily to the understanding of clinicians and researchers in using this device to analyze the language development of children with cochlear implants.

RELIABILITY OF LANGUAGE ENVIRONMENT ANALYSIS (LENA) SYSTEM IN QUANTIFYING CONVERSATIONAL TURNS IN VERBAL COMMUNICATION OF CHILD-ENVIRONMENT
Chitra Lakshumanan, Maddie Haar, Kayla Baumgartner, Sophie Ghoneim
Communication Arts and Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 46
Mentor(s): Meisam Khalilarjmandi, Laura Dilley, Matthew Lehel

Language acquisition in children is influenced by the quality and quantity of parental linguistic input, particularly for hearing-impaired children wearing cochlear implants (CIs). The number of conversational turns between children and their caregivers is strongly predictive of language outcomes. The LENA (Language ENvironment Analysis) is a wearable device used to study children's linguistic interaction with adults. LENA captures 16-hour recordings of a child's home environment and uses automatic speech processing to count conversational turns. To evaluate its usefulness as a clinical

tool, this study analyzes the reliability of LENA in accurately measuring conversational turns. According to LENA, a conversational turn is defined as adult and target child speech segments occurring in succession and separated by no other live human speakers. Quantifying turns as segment pairs, LENA is able to identify the number of conversational turns between children and their caregivers. LENA's misclassification of speakers and intervening audio can lead to several false positives or negatives within the data. Despite many clinicians and researchers using these metrics, there has not been a thorough analysis of how the accuracy of these metrics vary across individuals and speech environments. Human coders' classifications of conversational turns within short chunks of audio were compared to LENA's to obtain a measure of reliability. These results suggest that the effectiveness of LENA as a clinical tool for estimating conversational turns should be carefully evaluated to better understand the effect of conversational turns on language development of children with CIs and the etiology of its variability across children.

AGE, SPEAKING RATE AND VOCAL EFFORT
Kirsten Rockey
Communication Arts and Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 47
Mentor(s): Eric Hunter

Age-related changes occur in speech that are associated with structural, physiological and immunological processes involving the oral and nasal cavities, the larynx and pharynx, and the respiratory system. These factors influence the production and perception of voice. This study presents results from recordings of a long speaking task which included vocal intensity goals. Participants were 11 women over the age of 55 and 8 women of college age. Presented will be results of the participant's perception of effort over the duration of the long recording, their speech production differences, and perceived vocal quality differences with age as a primary factor.

WHEN RIVERS WERE TRAILS: AN INDIGENOUS EDUCATIONAL GAME
Alex Hogan, Ellie Locatis, Amber Ottarson
Communication Arts and Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 117
Mentor(s): Elizabeth LaPensee

When Rivers Were Trails is an educational 2D adventure game which follows an Anishinaabeg in the 1890's who is displaced from Fond du Lac in Minnesota to California due to the impact of allotment acts on Indigenous communities. With design by Alex Hogan and animation by Amber Ottarson, the player travels from Minnesota to California, maintaining their physical, emotional, mental, and spiritual wellbeing by canoeing, hunting, and fishing, while making choices about contributing to communities and honoring the people they meet. The game was developed in collaboration with the Indian Land Tenure Foundation and Michigan State University's Games for Entertainment and Learning Lab thanks to support from the San Manuel Band of Mission Indians.

SPARTY & "SPARTHAN": EXPLORING THE PROTEUS EFFECT IN VIRTUAL REALITY AND ITS CORRELATIONS WITH CAMPUS PRIDE AND MISOGYNISTIC ATTITUDES
George Mcneill, Gabriela Gendreau, Ian Crist, Whitney Zhou, Hanna Wong, Stefani Taskas, Ann Desrochers
Communication Arts and Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 118
Mentor(s): Taj Makki, Rabindra Ratan

Prioritizing the health and well-being of sexual assault survivors has been a salient and controversial issue for Michigan State University's administration. To this end, this study utilizes a virtual environment to examine whether sports culture at MSU relates to attitudes about sex-based issues on campus (e.g., the rape myth, sexual assault, sexism, and misogyny) as well as campus pride toward MSU as a whole. The experiment explores this question through the Proteus Effect, the phenomenon that avatar users tend conform behaviorally to their avatars' characteristics. During the study, users are randomly assigned to play as either Sparty or a less muscular look-alike in simple color variants. Specifically, we test whether participants -- after playing as Sparty in a virtual environment -- exhibit more misogynistic or apathetic attitudes towards sex-based issues than those who played as other variants.

ON THE OUTSIDE, LOOKING IN: CREATING NARRATIVE-DRIVEN GAMES EXPLORING EMPATHY AND PLAYER CHOICE
Aileen Dwyer, Hanna Wong, Shay Yao, Alec Tryan, Becky Roman, Gabriela Gendreau, George Mcneill, Stefani Taskas

Communication Arts and Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 119
Mentor(s): Rabindra Ratan

An anthology of narrative-driven games places players in several distinct social environments and asks them to make impactful choices. Will you lend a hand to a socially awkward student? Can you help a young boy understand why his family cannot afford to buy him trendy shoes? How do the outcomes of your choices feel when you take on the role of the awkward student or young boy? The narratives will dynamically change based on player choices. Attendees will be able to play through these games during UURAF. This project is part of a larger empathy games initiative being supported Office for Inclusion and Intercultural Initiatives. The multifaceted team from the College of Communication Arts and Sciences includes students with skills in computer science, game design, art, and creative writing. The game is designed to induce empathy and reduce stereotyping and an assessment study will test this hypothesis empirically. Depending on progress, results of this study will be presented at UURAF or attendees will be invited to participate in the study.

PARENTAL ATTITUDES TOWARDS CHILDREN'S EDUCATIONAL TABLET USE AT SCHOOL
Sydney Chu
Communication Arts and Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 120
Mentor(s): Fashina Alade

In today's educational learning environment, children have more access to technology than ever before (Rideout, 2017), which allows them to learn new and sophisticated information as well as to practice skills presented by their teacher. However, given that access to technology in school is relatively new, there is still much to learn about how best to support children's educational technology use. MSU's College of Communication Arts and Sciences, in collaboration with PBS and WKAR, is conducting a research project investigating the effectiveness of one-to-one tablet use in kindergarten on math and literacy outcomes. As a part of that larger project, the purpose of this research study is to investigate how parents feel about their children using these tablets at school, and how their attitudes towards technology may impact their children's tablet usage. We conducted a survey of 155 parents in the Lansing School District to understand their attitudes towards technology. Analyses of this survey data allow us to gain an understanding of parents' attitudes towards technology and how those attitudes differ by various demographic factors.

IMPROVING CARE IN THE PEDIATRIC EMERGENCY DEPARTMENT WITH VIRTUAL REALITY
Jessica Declercq
Communication Arts and Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 121
Mentor(s): Shelia Cotten

Emergency departments (EDs) have been shown to induce anxiety in children. Certified Child Life Specialists (CCLS) can distract children when they show signs of anxiety and/or pain during treatment. However, children may still watch the procedure, which could result in a failure of the distraction. Virtual reality (VR) is increasingly being used in hospitals, as both vision and hearing are blocked by the headset. To improve care delivery for children in the ED while receiving IV placements, we utilized VR to determine whether it could decrease pain and anxiety. Thirty participants between the ages of 5 and 12 were randomly assigned to either VR or the standard of care distraction (SD). Those in the VR group played a game while wearing a VR headset. Those in the SD group had the CCLS use standard distraction methods. Seventy-five percent of the VR group's guardians and 94 percent of the SD group's guardians agreed that the distraction reduced the child's anxiety, while 75 percent of the VR group's guardians and 88 percent of the SD group's guardians agreed that the distraction reduced the child's pain during the IV placement. The use of technology in conjunction with the CCLS shows great potential to reduce pain and anxiety while improving healthcare delivery. Because both groups received positive outcomes, the use of technology compared to no distraction should be examined to fully understand the effect of digital distraction with human interaction. The option of technology with caregiver guidance may lead to a better healthcare experience.

MSU STUDENT PERCEPTIONS OF SOCIAL SCIENCE KEY WORDS AND DEPARTMENT NAMES
Vincent Black, Joey Seitz, Ariclenes Silva, Hugo Victor
Communication Arts and Sciences, Poster Presentation

Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 122
Mentor(s): Amber Pearson

Over the last two decades, there has been a struggle among college geography departments to stay relevant in the modern era. While department renaming and rebranding is not anything new in higher education, geography programs have seen, between 2000 and 2014, a record change in department name adjusting, with some departments dropping *geography* completely. However, many departments continue to struggle to attract undergraduate students despite the efforts made by rebranded departments. This multi-university lead research was conducted with the purpose of assessing student perceptions to keywords typically found in geography course names and program descriptions. Student perceptions were also sampled on the most common phrases of academic department names in the social sciences, especially relating to the environment, sustainability, and geography. Our study of students applies a mixed methods approach to obtain student perceptions of keywords typically found in geography courses and programs. In this, we obtained student perception data using qualitative focus groups and quantitative data using digital surveys delivered on tablets. With Michigan State University (MSU) being the largest university conducting the study, our MSU results provide a preliminary analysis of students' perceptions and interest within the discipline of geography.

THE NEUROTOXIC EFFECTS OF LEAD ON FLINT'S CHILDREN AND POTENTIAL IMPACT ON HIGH SCHOOL GRADUATION RATES
Shannon Campeau
Communication Arts and Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 233
Mentor(s): Matthew Phillips

In 2014 the city of Flint, Michigan switched their water supply to the cheaper Flint River, exposing residents to high lead levels in their water from the pipes. Thousands of children were exposed to extremely high levels of lead, which research shows can have lasting impacts on the brain and development of literacy, attention, math, and language skills. Flint children, who are already at greater risk for dropping out of school due to a low socioeconomic status, will be at an even greater risk because of the long term neurotoxic effects of lead. Research done by John Hopkins University has developed Early Warning Indicators (EWIs) of the likelihood of dropping out of high school, beginning measurement in 1stgrade through 9thgrade. These indicators measure attendance, behavior, and coursework. Lead exposure has adverse effects on the health and wellbeing of a child which is measured by attendance in school, attention and self-regulation skills for behavior in school, and literacy, math, and language skills used in coursework to progress in school. If no measures are taken, a potential consequence of both the high lead levels and lack of educational resources and funding could result in a continued increase of high school dropout rates.

STORYTELLING IN SCIENCE
Anntaninna Biondo
Communication Arts and Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 234
Mentor(s): David Poulson

In today's climate, environmental journalism remains the "most important beat in the world", according to my faculty mentor Dave Poulson. During my time working at the Great Lakes Echo the most valuable lesson I learned is simple, but it's simply essential. Ask the right questions. I've had the honor of speaking to distinguished climatologists, sedimentologists, Great Lakes policy makers and indigenous people about their concerns. Each niche comes with its own lexicon so it becomes so important to ask the questions that give the greatest explanations. Keeping in mind that my audience should come away confident in their understanding of the article, I know I need to find that balance between simplifying scientific concepts and trusting their intelligence. My end goal is always to empower the reader and empower the issue.

FACULTY, UNDERGRADUATE, AND GRADUATE GRANT WRITING FOR MULTIMODAL PROJECTS
Megan Elias, Mimi Anagli, Allison Costello
Communication Arts and Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 235
Mentor(s): Alexandra Hidalgo

Our team, which consists of two graduate students, three undergraduate students, one faculty member, and one film editor brings together each member's unique field of expertise to work on a variety of projects, including an online publication. For this presentation, we will be focusing on the grant applications we write for the feature documentary The Weeping Season and the process of creating effective grant applications to secure funding for a film. Drawing from our blend of skills in web and graphic design; copyediting; and photo, video, and film editing, we discuss the different aspects of both the filmmaking and grant application processes, and each person provides an account of the specific role they play in creating such complex documents. On our poster, we will discuss the collaborative way film grant applications are written, edited, and formatted. One of the additional requirements for these types of grants is a sample of the film, and creating that can entail anything and everything from caption-writing, translating, color and sound correction, and draft feedback and revisions. This past year, we applied for 8 grants for The Weeping Season. We will use this experience to demonstrate the necessity of cross-disciplinary teams and the need of providing funding for arts and humanities.

PIONEERING BRANDING STRATEGIES FOR THE MICHIGAN STATE DIGITAL & COMMUNITY PUBLISHING COLLECTIVE
Sam Bloch
Communication Arts and Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 236
Mentor(s): Kate Birdsall

MSU's Digital & Community Publishing Collective (DCPC) is a pioneer organization on campus. The DCPC serves to centralize support and act as a resource to various digital and paper publishing activities. Like many brand new contemporary groups, the DCPC is using social media to engage with an audience of students, writers, publishers and community partners. As such, it allows us to gain insight into user interactions with content serving a broader community rather than interactions with each individual publication. Since the DCPC's primary mission is not to monetize its resources, the greater need for such marketing lies in brand awareness, lead generation, and community building. The DCPC would like to assist more publications by extending its roots deeper into the Greater Lansing Community. Committed to fostering experiences for a diverse audience, the DCPC has begun using such tools as Facebook, Twitter, and Instagram to establish a core brand. This research displays the results of community engagement through each of the three sites listed above. Using SEO and analytics, this data was collected to explore the usefulness of social media marketing pertaining to the collective. Additionally, one can see how redirections from social media may lead to increased website traffic, which highlight the connection as a mutually beneficial relationship between social sites, the actual web page for the DCPC, and firsthand interactions with the resources the collective provides. In doing so, this research offers telling insights on what might be successful strategies to employ when engaging with unique audiences for unique organizations.

THE HEALTH BELIEF MODEL (HBM) AS AN INTERPRETIVE TOOL FOR COMMUNICATION RESEARCH: UNDERSTANDING HPV VACCINATION RATE ATTITUDES AMONG COLLEGE-AGED MALES
Kyle Cameron
Communication Arts and Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 237
Mentor(s): Maria Lapinski-LaFaive, Minwoong Chung, Sunyoung Park

The Health Belief Model (HBM) in communication research hypothesizes that effective messages motivating attitude and behavior change are moderated by knowledge, self-efficacy, perceived barriers, susceptibility, severity, and benefits. The purpose of this presentation is to discuss the role that the HBM plays when an individual is making decisions regarding health and, specifically, their intent to get vaccinated for sexually transmitted diseases such as HPV. The subject group of college-aged males represent a population that is at risk, and this presentation seeks to represent the factors moderating their behavior to vaccinate and the attitudes associated with these healthcare decisions.

IDENTIFYING COMMUNICATIONS IN CONSTRUCTION PROJECTS THROUGH SOCIAL NETWORKS
Carolyn Whiting, Patty Girardot
Communication Arts and Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 238
Mentor(s): Dong Zhao, Sinem Mollaoglu, Kenneth Frank

Communication is vital to accomplishing Architecture, Engineering, and Construction (AEC) projects. Success of construction projects especially relies on efficient communication among stakeholders who are connected throughout the design and construction process. However, their communication is difficult to capture, quantify, and assess. This study attempts to better understand the connections that are formed during the AEC project process and to discover the connections that have potentials to improve communication in the organization. Project meeting and email data from real-world projects are collected and analyzed using social network analysis (SNA) technique. Results inform varying characteristics of communication among team members. With this information, the strength of the social networks among all team members can be visualized. The visualized networks enable to distinguish where a connection is missing and suggest where to create such connection that is previously lacking. As a result, communication along project process will improve and the improvement is expected to greatly benefit project performance.

WATCHING ZOO ANIMALS TO REDUCE STRESS
Anish Nimmagadda, Jessica Hirsch, Alan Smith, Noah Hirsch
Communication Arts and Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 287
Mentor(s): Saleem Alhabash, Anastasia Kononova, Patricia Huddleston

As we live in "stressful" times with numerous issues concerning many people around the world, it is important that community services highlight relevance and benefit to consumers. The current project was conducted in collaboration with the Doner agency in Detroit and the Detroit Zoological Society. The aim of the project was to investigate the stress-reducing effects of observing and interacting with zoo animals, which is set to contribute to an advertising campaign promoting the Detroit zoo. The study reports results from a field study conducted at the Detroit Zoo and a lab-based study that investigated the effects of watching zoo animals on psychophysiological and self-report measures of stress and anxiety. To do so, participants completed the Trier Social Stress Test as a means of inducing stress, and then they were shown, either in person at the zoo or via video stimuli in the lab, zoo animals (e.g., butterflies, otters, and giraffes). After the data collection was performed, we observed a decrease in stress levels as a function of exposure to zoo animals. We also observed participants' psychophysiological responses such as heart rate, pulse, and skin conductance, which indicated the activation of the parasympathetic nervous system. This meant that the participants felt a calming effect after observing zoo animals at the Detroit Zoo.

INTERPRETED POLITICAL INTEREST: EXPERIMENTALLY MANIPULATING CIVIC CUSTOMIZATION TO MEASURE EXPOSURE TO POLITICS ON FACEBOOK
Victoria Topor
Communication Arts and Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 288
Mentor(s): Kjerstin Thorson, Mel Medeiros

Political interest has been shown to predict exposure to politics, but on social media, display algorithms decide what of the available content users will see and determines exposure more so than individuals themselves. This study attempts to understand how manipulating civic customization on Facebook affects interest categories and political exposure through active and passive civic customization. We conducted an online experiment with students who are at least moderately active on Facebook. Students were randomly assigned to either an active, passive or control group. Customization included liking pages (active) and liking posts (passive) from an assigned set of politically affiliated pages on Facebook. Students were told to download their Facebook advertising category data at the beginning of the week before completing tasks, and after one week had passed after completing tasks so we could track the changes in their customization (the liked pages and posts) and their categorization (ads interests). We predicted that the civic customization groups will a) see more political & news posts in their timelines, b) have larger increases in political knowledge, and c) be more likely to be categorized as interested in politics and news than the control group.

DRIVING, INTERRUPTED: PSYCHOPHYSIOLOGICAL EXPLORATION OF THE EFFECTS OF LISTENING TO MUSIC INTERRUPTED BY ADS ON DRIVING PERFORMANCE, EMOTIONAL PROCESSING, AND TASK IMMERSION AND SATISFACTION
Jessica Hirsch, Noah Hirsch
Communication Arts and Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 289

Mentor(s): Anastasia Kononova

Media multitasking is defined as performing multiple tasks simultaneously, through the use of multiple media vehicles or devices. Multitasking with music has been found to increase productivity, task performance, mood and satisfaction. However, media-related tasks have also been shown to be detrimental to the completion of one task while attending to another. This study explores whether listening to a music stream interrupted with advertisements affects task performance, satisfaction, immersion and emotional processing. This study was an experiment with three driving conditions: music, music + advertisements, and silence (control). Based on the results of two pretests, two songs ("Don't Wanna Know" and "Starboy") were included for the music stream and two products (sneakers and pens) that were identified as being the most relevant to college students were used to create advertisements. During the main study, each participant was exposed to three manipulation conditions while playing a driving simulation game. Each condition lasted three minutes, during which the driver's road violations were tracked and recorded, followed by a questionnaire about perceived driving performance, driving task satisfaction, self-reported valence and arousal, and immersion in the driving task. Participants' physiological responses, skin conductance and facial electromyography (EMG), were measured during the experiment. The preliminary data indicate that while the silence condition evokes a positive emotional valence response (measured physiologically, using facial EMG) and was perceived to be the most satisfactory compared to the other two conditions, participants considered it to be the least enjoyable and the least arousing when compared with the music conditions.

MEDIA WIELDING POWER? NEWS COVERAGE OF THE BLACK LIVES MATTER MOVEMENT
Hakeem Weatherspoon
Communication Arts and Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 290
Mentor(s): Rachel Reis Mourao

The killing of Trayvon Martin in 2012 revealed a deeply-divided country, marking the rise of a new social movement: The Black Lives Matter. In 2014, Michael Brown was killed by a police officer, starting a new wave of protests in Ferguson, Missouri. This project focuses on news media coverage of both cases in the months before and after the trials of assailants George Zimmerman and Darren Wilson. Using inductive reasoning, a qualitative textual analysis compared and contrasted the coverage of Martin and Brown. Preliminary results show that coverage of stories about Martin focused on the trial process, jury selection, race conflict, color blindness, and other systematic issues. Conversely, news about Brown focused on protests. Stories highlighted police brutality against protesters and reporters, which limited press freedom and led to misconstrued, partial information. Coverage emphasized the disproportional use of force and military tactics by the police during demonstrations. In both cases, journalists neglected demands of the family. Social movements like BLM attempt to diminish systematic violence against minorities. As the first draft of history, news coverage of protests matters because it can influence how society perceives social injustice. Findings suggest that the Black Lives Matter movement wasn't as successful as it could have been because of the violence that was pushed forth through the movement. As the cases evolved, news coverage displayed BLM as a violent movement, focusing on conflict instead of ideas. The abolishment of this symbolic violence would support a movement that is rooted in love and respect.

THE EFFECTS OF CANDIDATE ORIENTATION AND PLACEMENT ON EVALUATIONS AND BEHAVIORAL INTENTIONS IN POLITICAL ADVERTISEMENTS
Alan Smith, Noah Hirsch, Anish Nimmagadda
Communication Arts and Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 291
Mentor(s): Saleem Alhabash, Esther Thorson

In the modern world of advertising, an effective initial impression is often critical in garnering attention towards an ad, which could translate to a favorable influence on attitudes and behavioral intentions. This fact is particularly important in the realm of political advertising, where a first impression can make or break a candidate's appeal towards a prospective voter. The current study investigated the effects of the placement (left vs. right) and face orientation (inward vs. outward) of candidates of varying political lineage (conservative vs. liberal vs. unidentified) on visual attention and self-report measures of ad effectiveness. Participants were shown six second iterations of political advertisements, which differed only in the facing direction and spatial alignment of the political candidate being promoted and were then asked to describe their attitudes towards the ad and candidate, as well as the likelihood of subsequently interacting with the ad if observed in a social media setting. During ad exposure, participants' eye-movements were tracked using a Tobii

TX300 eye-tracker, which documented their gaze path, fixation duration, and fixation count to different elements (i.e., areas of interest or "AOIs") in the ad (e.g., candidate picture, ad copy, candidate attributes). Self-reported data displayed a significant and large effect of candidate face orientation, which interacted with the political ideology of the candidate. The results of the study can lead into further research focusing on the visuals of candidates within ads to increase their effectiveness in gaining positive feedback and enacting action.

COMPUTATIONAL ANALYSIS OF FRAMING IN CLIMATE CHANGE MEDIA, 2012-2015
JD Lavaccare
Communication Arts and Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 292
Mentor(s): Kjerstin Thorson

We draw on 3 years of Twitter data about climate change-related events to computationally analyze framings in news media stories. We use a dictionary approach to analyze framings in news stories from climate change events between 2012-2015. We compare data to find whether climate frames displayed careers over this time period; that is, whether they showed patterns of increased or decreased use in conjunction with and following relevant climate events.

REPORTING WITH THE GREAT LAKES ECHO
Angela Mulka
Communication Arts and Sciences, Oral Presentation
Section: 5, 8:45 AM, Lake Erie Room
Presentation Number: 672
Mentor(s): David Poulson

Being a reporter for the Great Lakes Echo means that I conduct research all about environmental science and natural resources, as well as sustainability. The research stems from interviews I have with experts in the field, along with average people who often experience some type of environmental issue. These conversations allow me to share the knowledge of new developments in the environmental world with the public. I will be sharing various stories I have published.

THE EFFECT OF MEDIA MULTITASKING ON PSYCHOLOGICAL REACTANCE
Grace Daniel
Communication Arts and Sciences, Oral Presentation
Section: 5, 9:00 AM, Lake Erie Room
Presentation Number: 673
Mentor(s): Anastasia Kononova

The purpose of the study is to analyze how watching public service announcement videos while being distracted by an additional media task affects psychological reactance in terms of emotional and cognitive dimensions. Psychological reactance states when an individual knows they're being persuaded; they are more likely to have more negative reactions towards messages. If an individual feels threatened of losing their freedom to make their own decisions, they will experience higher levels of arousal, anger, and try to restore the freedom they believe they have lost. Humans have lower ability to comprehend and argue against messages when they multitask, leading to an easily accepted message. It was predicted that in the multitasking conditions, individuals will be less likely to experience anger, threat to freedom, counter-arguing, and negative thought listing. The study was a 3-x-3 experiment. Each participant in the experiment watched three videos: 1) about sugar consumption, 2) social media usage, and 3) environmentally conscious behaviors. Participants were split to three groups. In one group ? media multitasking condition, - participants texted on a mobile device and watched the videos. In the second group, - non-media multitasking condition, - participants watched the videos and drew pictures on a white board. In the third condition, - control condition, ? participants only watched the videos. Results showed in media multitasking and control conditions, participants rated anger significantly different than in the non-media multitasking condition. Participants found more flaws in the videos when they were not multitasking versus when they were multitasking.

ESTABLISHING THE DIGITAL & COMMUNITY PUBLISHING COLLECTIVE AT MSU THROUGH A LITERATURE REVIEW AND GRANT PROPOSAL ANALYSIS
Emily Jenkins
Communication Arts and Sciences, Oral Presentation
Section: 5, 9:15 AM, Lake Erie Room
Presentation Number: 674
Mentor(s): Kate Birdsall

The implementation of a university press has become standard at major academic institutions. These publishing organizations serve as branches of their universities, specializing in academic articles and other scholarly works. However, many universities offer publication opportunities to students and faculty that do not qualify as acceptable for publication within university press. This prevents non-scholarly publications from attaining the ethos of carrying the university publication name and bars them from becoming a part of the publishing community at their respective institutions. To combat this problem, Michigan State University launched the Digital & Community Publishing Collective to serve as a support mechanism for a wide range of publishing activities, including a monthly magazine, a literary journal, scholarly journals, a community of feminist filmmakers, a collaborative fandom, a blog, and a zine. The goal of this publishing collective is to provide a space for a diverse range of people and publications to build community and participate in a university-sponsored publishing organization. This research first establishes the legitimacy of the university publishing collective as a concept by performing a thorough literature review and landscape analysis. It then applies this data to the brand strategy for the DCPC and conducts research on grants available that will provide the funding necessary to build a powerful digital space. This research will help the DCPC successfully establish itself within the university publishing community and inform other universities that attempt to implement similar collectives.

ANALYSIS OF THE PHASE OF DISTORTION PRODUCT OTOACOUSTIC EMISSIONS
Cayce Warman
Communication Arts and Sciences, Oral Presentation
Section: 5, 9:30 AM, Lake Erie Room
Presentation Number: 675
Mentor(s): Maryam Naghibolhosseini

Sound signals can be generated inside the cochlea by presenting two tones in the ear canal. These sounds can travel back toward the ear canal and be recorded by a sensitive microphone in the ear canal. The recorded emissions are called distortion product otoacoustic emissions (DPOAEs). The DPOAEs are a combination of the generator and reflection components. The generator component is due to the cochlea active mechanism and the reflection component is the reflection of the wave due to cochlear irregularities. Measuring DPOAE with high-frequency resolution, the in-phase and out-of-phase interaction of the two components builds a pattern with lots of minima and maxima, called the fine structure. In this project, the two components were extracted from the DPOAE signals using a least square fit algorithm and their phases were used to estimate the places of minima and maxima. A frequency shift in the places of maxima and minima was found across different levels of the stimuli. Such information can be potentially used to determine the normal function of the cochlea.

PROJECT FLINT
Courtney Pasek
Communication Arts and Sciences, Oral Presentation
Section: 5, 9:45 AM, Lake Erie Room
Presentation Number: 676
Mentor(s): Judith Walgren

My work shows an overview of the archival research I have conducted over the course of 6 months on behalf of an AR project that focuses on the old, booming city of Flint, MI. I hunted down old pictures of schools, industry and the everyday environment of how Flint used to be prior to the 2010s.

DIGITAL MEDIA

CREATING CONTENT TO IMPROVE PARENTING HABITS
Dylan Kissel
Digital Media, Oral Presentation
Section: 1, 11:00 AM, Lake Erie Room
Presentation Number: 681
Mentor(s): Amol Pavangadkar

Having spent the past three years of college immersed in the media world, this project has been unlike any other I have worked on before. After taking numerous film and production courses and developing my skills, working in a professional environment is very eye opening. Once I started this project, I managed to transfer my academic learning into practical knowledge. As an associate producer and the primary crew on this project, there are elements and practices which will be helpful for me when I become a parent. Using good directions has particularly changed how I will think of talking to children, but also how I will address my peers in a more respectful manner. As I was at each shoot, I realized the diversities of struggles but also the commonalities of the family situations. These similar traits are what will allow this project to become online based tutoring for other parents going through the same struggles. It will also make it appealing for people to watch on public television. These parening videos will showcase issues and challenges in a family that are invisble to outsiders. Showcasing the experiences and coping strategies of these families will help us inform others.

GAMIFICATION OF COMM ARTS
Will Johnston, Ellie Locatis
Digital Media, Oral Presentation
Section: 1, 11:15 AM, Lake Erie Room
Presentation Number: 682
Mentor(s): Brian Winn

During the 2018-2019 academic year, we installed three arcade cabinets in the north lobby of the Communication Arts and Sciences building. The gamification of Comm Arts was intended to help showcase and promote the top-ranked MSU GameDev program. The primary goal was to have a location to showcase student and faculty work. We were also really interested to see what the impact of a showcase of student works and projects would do to build awareness of the program. Throughout the installation and setup we asked a number of questions about the program and an increase in interest in the game dev program here at MSU. This was not a not a one-time event but rather a digital media installation comprised of projects from the gamedev program here at MSU.

DEAD ENDS - A SHORT FILM
Mallory Maxton, Zhiying Zhen, Bradley Coster, Ryan Carlson
Digital Media, Oral Presentation
Section: 1, 11:30 AM, Lake Erie Room
Presentation Number: 683
Mentor(s): Rola Nashef, Jeff Wray, Peter Johnston

The fiction filmmaking capstone is a year long course sponsored by the Department of English. Twenty-something students come together and complete a short film from start to finish. The film is conceived, written, shot, edited, and premiered within the calendar year. The fiction filmmaking capstone is a year-long course sponsored by the Department of English. Twenty-something students come together and complete a short film from start to finish. The film is conceived, written, shot, edited, and premiered within the calendar year. With many of us being seniors, this class and project is an unparalleled opportunity for us to hone our craft before graduating and being thrust into the real world. We have guidance from key faculty, but we are more often than not given full control over the project. All triumphs, mistakes, and road bumps are our own. While this project does not fit within the usual parameters of research, we have still been fully immersed in the filmmaking process and would use this time to present an overview of how this project works, screen a short scene from our project, and discuss how it has bettered us as filmmakers and creatives.

MSU TV: GROWING A CAMPUS TELEVISION CHANNEL
Zoe Kissel, Elizabeth Keller
Digital Media, Oral Presentation
Section: 1, 11:45 AM, Lake Erie Room
Presentation Number: 684
Mentor(s): Troy Hale

After years of inactivity, the Michigan State University campus-wide television channel has been given a rebirth. Since the fall of 2018, MSU TV has been remarketed as a channel made for Spartans, by Spartans. Through research, both of our audience and other university campus channels, we have found a direction for MSU TV that we believe will be successful in guaranteeing our campus-wide reach. We have began rebranding, programming, and re-involving Spartans in MSU TV. As the development of MSU TV continues, we want to create inclusivity and unification through our channel by involving all aspects of Michigan State University. We have only just touched the surface of group involvement through weekly meetings connecting crew with writers who are creating content for MSU TV. Our goal is to have Spartans, whether students, faculty, staff, administrators, programs, groups, alumni, etc., be able to learn about MSU and the accomplishments that are being made at the university through MSU TV, while also having an attractive platform to showcase their own work.

REAL WORLD CREATIVE RESEARCH
Andrea Uglietta
Digital Media, Oral Presentation
Section: 2, 1:30 PM, Lake Erie Room
Presentation Number: 691
Mentor(s): Amol Pavangadkar

What we have been working on is creative research. Our work involves a partnership between Michigan State University and the Michigan Department of Health and Human Services to plan and execute multiple promotional videos. I worked under a mentor of mine, Professor Amol Pavangadkar, along with fellow associate producers to execute interviews with families that come from all over Michigan to evaluate how positively the Government parenting program, PMTO, has affected their lives. Our job is then to careful analyze these interviews and work to summarize the impact this program has made in our community. Learning the ins and outs of how to work appropriately and professionally with clients was a task I was never faced with prior. On set etiquette, professionalism, preparation, and efficiency were all put to the test with each interviewee assignment. Not only execution, but pre and post production is a heavy part of an assignment like this. Months before the interviews take place, our crew is scouting locations, prepping interview questions, researching the PMTO program, coordinating staff and shoot dates, and making sure we have all the equipment we need to do the job efficiently. Once it is time to execute the interview, we take all of our experiences and associated research to create the story through live reenactments. Eventually, we take all of our footage and create something that will effectively inform parents about the PMTO program and be aired on local PBS stations.

AN INVESTIGATIVE DOCUMENTARY SHORT: Q&A WITH THE FILMMAKERS
Evan Kutz
Digital Media, Oral Presentation
Section: 2, 1:45 PM, Lake Erie Room
Presentation Number: 692
Mentor(s): John Valadez

Rockford is a cozy West Michigan town just north of Grand Rapids, and home to Wolverine Worldwide and its numerous shoe brand headquarters. This local-turned-global shoe manufacturer helped build the local economy yet was discovered to have historically polluted drinking water of thousands of residents throughout Kent County by improperly disposing of leather tannery waste, leaving behind high levels of harmful man-made "forever chemicals" linked to cancer and other diseases, collectively known as PFAS. Residents who've supported the company for generations feel betrayed. Meanwhile, a group of neighbors with contaminated wells have become close friends through their shared affliction, growing into community activists. A widow believes her husband's cancer was caused by their drinking water. Without medical solutions, mothers with children carrying some of the highest-recorded PFAS blood levels are terrified for the future of their children's health, as well as their own. Now more like a family, the close bonds are what help these neighborhood families through the trying times. Together they look after one another, meeting regularly to speak their anxieties and share their frustrations, but also share accomplishments and plans for fighting back. We hope this film, by showing examples of ordinary people acting extraordinarily, will show others they too can take a stand for their communities. Citizens need to demand that their state and federal lawmakers make pass legislation to more carefully

and smartly regulate the manufacturing and disposal of industrial chemicals while holding the responsible parties accountable to remediate the damage caused from environmental pollution.

FOCAL POINT NEWS
Griffin Stroin
Digital Media, Oral Presentation
Section: 2, 2:00 PM, Lake Erie Room
Presentation Number: 693
Mentor(s): Robert Gould

Focal Point is an Emmy awarding winning, student produced newscast from the School of Journalism at Michigan State University.

RAP ON FLINT "BREED" DOCUMENTARY
Olivia Hoover
Digital Media, Oral Presentation
Section: 2, 2:15 PM, Lake Erie Room
Presentation Number: 694
Mentor(s): Geraldine Zeldes

"Breed" is a documentary centralizing on the life of Eric "MC Breed" Breed, a rapper native to Flint, Michigan. The documentary focuses on hip hop/rappers/rap groups from Flint, along with producers/managers, telling the story of Breed's influences and legacy that was cut too short due to illness. I'm the Producer of this documentary and will be speaking about the work I've done since last August.

EDUCATION

QUALITATIVE DATA ANALYSIS OF LITERACY AND LANGUAGE INSTRUCTION WITH IMMIGRANT-ORIGIN YOUTH
Megan Hartwig
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 48
Mentor(s): Carrie Symons

There are many different ways to research teaching and learning in classrooms, but to understand how teachers and students co-construct meaning, one of the only ways to do so is through discourse analysis - the study of the instructional discourse (what teachers and students actually say) in classrooms. As an elementary education major who is earning a minor in TESOL (Teaching English to Speakers of Other Languages), I have taken an up-close look at different discourse moves a teacher can make during whole-class discussions to elicit student thinking. In this presentation, I will share what I have learned through the process of transcribing the instructional discourse that occurred during three literacy and language-focused lessons with middle and high school immigrant-origin youth who are simultaneously learning content, learning an additional language (in this case, English), and acculturating to a new country. Implications for teaching will be specified.

OBSERVATION OF VOCALIZATIONS OF PRESCHOOL AGED CHILDREN WITH ASD
Savannah Csokasy
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 49
Mentor(s): Sarah Byrne

This preliminary observational study seeks to find any trends and differences of speech in preschool aged children with ASD at home versus at school. The study used a LENA device to record childrens speech patterns throughout the day at school and at home on two seperate days and then analyzed the data for any patterns or interesting findings.

IMPROVING STUDENTS' UNDERSTANDING OF CHEMICAL CHANGE
Carly Seeterlin
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 50
Mentor(s): Kirsten Edwards

Students' understanding of the nature and structure of molecules is crucial to understanding chemistry as well as much of the physical, life, and earth sciences. This understanding of molecules requires students to be able to comprehend how a concept can be represented in multiple forms. The objective for this study is to design and implement an intervention resource based on collected data. The intervention resource is designed for teachers and is targeted towards students are not yet proficient with the concepts of molecular movement and molecule rearrangement during chemical reactions as presented in the *Carbon TIME* curriculum. *Carbon TIME* is a curriculum for middle and high school students focused on transformations of matter and energy. The intervention resource was run with four focus students from the sample class, which was video-recorded. Following this, the intervention was modified due to student needs and administered to the entire class. Results from this data have been analyzed and has shown that the intervention improves student comprehension pertaining to different representations of matter and molecules.

COMPARING AND CONTRASTING IN SCHOOL EXPERIENCES FOR SECONDARY STUDENTS WITH INTELLECTUAL DISABILITY IN RURAL & URBAN SCHOOL DISTRICTS
Patty Costello
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 51
Mentor(s): Emily Bouck

The purpose of this research is to determine whether secondary students with intellectual disability have different in school experiences based on whether they attend school in a rural or an urban district. Based off the data from the National Transition Longitudinal Study, our findings show secondary school students with an intellectual disability in rural or urban school districts are less likely to receive services for their disability. This finding also gives insight into preliminary data that suggests these students in a rural or urban districts are less likely to be prepared for independent living by the age of 30 when compared to students with intellectual disabilities attending a suburban school districts. It is important to compare these different in school experiences for students with intellectual disability because it highlights the disparities between school settings when evaluating services provided to these students. Even though this study pertains to students within the special education curriculum, the findings point to a broader inequity within different school systems that can have a possible effect the educational experiences for those in any educational setting.

EFFECT OF INTERDISCIPLINARY EXPERIENTIAL LEARNING COURSES ON STUDENT ACADEMIC AND PROFESSIONAL DEVELOPMENT
Clare Firn, Jamie Raupp, Azana Cochran
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 52
Mentor(s): Jeffrey Grabill, Robert Montgomery

The Hub for Innovation in Learning and Technology strives to better prepare Michigan State University students to become global innovators by developing an active education model, as well as providing space for such innovative courses. Our study sought to identify and quantify the educational benefit of experiential and interdisciplinary learning programs on students' academic and career development. We also sought to explore the influence such a space and active classroom had on the students. These were examined through the experiences of students enrolled in the Snares to Wares Initiative course created by Dr. Robert Montgomery and Ron Iwaszkiewicz. The Snares to Wares Initiative course positions students as business operators and is based on the deliverance of a series of knowledge process outsourcing (KPOs) and defined success for the Snares to Wares Initiative itself. We examined student academic and career development through a survey collection on students' academic performance, career interests, and T-shape professional classification.

EMPLOYMENT READINESS TRAINING FOR TRANSITION YOUTH WITH DISABILITIES
Alex Ward
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 53
Mentor(s): Connie Sung

For many youth with disabilities, the transition from school into the workplace can be challenging. Often times, youth with disabilities have severe difficulties obtaining and maintaining a job due to lack of vocational and social skills. Employment readiness training is much needed for this youth population to ensure a successful and smooth transition. The research team has developed two theory-driven, group-based, employment-related training programs, namely Assistive Soft Skills and Employment Training (ASSET) and Employment Preparation and Application Skills Support (EPASS), to address the workplace readiness needs. ASSET and EPASS are designed to improve work-related soft skills, work readiness, and job attainment and maintenance skills for transition-aged youth with disabilities. Each program consists of 11, weekly, 90-min group sessions with 6-8 participating youth with disabilities, delivered in community-based settings. Twenty-one youth with disabilities (mean age = 17.71; *SD* = 0.90) who have disabilities, including autism, intellectual disability and ADHD, participated in the ASSET and EPASS programs. Participants completed surveys before and after taking part in the program. Preliminary research findings show that participants improved in work-related social skills, job readiness, self-confidence and mental health after participating in ASSET and EPASS. This poster will examine the usability and applicability of the ASSET and EPASS curriculums in community-based settings and the effects of the program for transition-aged youth with disabilities who have participated in the program. Finally, lessons learned throughout the implementation process and recommendations for teachers, researchers and clinicians will be addressed.

THE ROLE OF FAMILIAR MUSIC ON COLLEGE STUDENTS' INFORMAL LEARNING
Mckain Williams
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 54
Mentor(s): Isaac Record

A cross section of students from the Lyman Briggs College participated in a two-part study on the influence of music on studying in college students. The purpose of this study was to gauge the prevalence of music in the informal learning environments of students, and then to measure if the familiarity of music is a key factor of how well students are able to focus on their materials. A survey was completed by Lyman Briggs College students of varying ethnicities and genders responding to questions regarding their personal habits of integrating music into studying. Next, an independent t test was completed to compare the cognitive test scores of students while listening to either no music, an unfamiliar classical music song held constant throughout trials, or a familiar song personalized to each student by using the 'Spotify wrapped' feature on the Spotify music streaming app. Silence was used as the control group, the unfamiliar classical music song was used as a comparison since classical music is often thought of as the ideal studying genre regardless of one's familiarity with it, and a personalized highly familiar song was used as the 'familiar' song to test whether the familiarity of a song is solely responsible for the ability of a student to be able to focus while listening to music and studying.

RACIAL SEGREGATION WITHIN CHICAGO PUBLIC SCHOOLS
Hayley Smalec
Education, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 135
Mentor(s): Nazita Lajevardi

In 1954, The Supreme Court case Brown v. Board of Education of Topeka served to end the legal segregation of schools in the United States. School segregation is an important issue because previous research has shown that minority students are more likely to achieve in schools that are well integrated. Sixty-five years after the court decision, my research looks to examine if school segregation is still present in schools today. There are many factors that can contribute to school segregation, but the one I will discuss in my research is the impact of school choice. Using data from Chicago Public Schools collected for the 2017-2018 school year, I calculated the number of schools that had over and under representations of certain racial/ethnic groups. My research also compared the racial makeup of the school district to the racial makeup of the city of Chicago. In this presentation, I will present my findings of representation

within Chicago Public Schools, examine school choice and the impact that it can have on school choice, as well as present policy options that other school districts have used to combat modern day school segregation.

APP-BASED MANIPULATIVES AND EXPLICIT INSTRUCTION TO SUPPORT DIVISION WITH REMAINDERS
Kennedy Levy
Education, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 136
Mentor(s): Emily Bouck

In theory, both virtual manipulatives and explicit instruction are viable options to support students with disabilities as they learn mathematics. This study explored the effect of a treatment package - an app-based virtual manipulative (Cuisenaire® Rods) in conjunction with explicit instruction - on students' acquisition and generalization of solving problems involving division of whole numbers with remainders. Three middle school students with disabilities participated in this multiple baselines, multiple probe across participants single case design study. Each of the students acquired the mathematical behavior of being able to solve division with remainders problems. In other words, a functional relation existed between the intervention package of explicit instruction and the Cuisenaire® Rods app-based manipulative and students' accuracy in solving division with remainders problems. Yet, two students failed to generalize the skill without the explicit instruction and use of the app-based manipulative.

DEVELOPING A FRAMEWORK TO ANALYZE STUDENTS' CAUSAL MECHANISTIC REASONING ABOUT POTENTIAL ENERGY
Rozzie Bloch
Education, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 137
Mentor(s): Melanie Cooper

At Michigan State University many students take CLUE (Chemistry, Life, the Universe, and Everything), a transformed general chemistry curriculum. Prior research in developing CLUE suggested that one of the biggest challenges for students was linking molecular properties to macroscopic ideas (Cooper and Klymkoswky 2013). Hence, to engage in causal mechanistic reasoning, it is important to identify and unpack the underlying factors and link them to the macroscopic phenomena occurring (Krist et al. 2018). In CLUE, general chemistry is organized around four core ideas, one of which is energy. However, based on analysis of exam responses collected from traditional general chemistry students, we know that students have several misconceptions around the transfer of energy (Becker and Cooper 2014). Therefore in CLUE, we place emphasis on helping students develop a causal mechanistic understanding of energy changes, explicitly linking the interactions that occur at the atomic-molecular level with changes in the potential energy of the system. To assess the impact of these changes, we analyzed a series of scaffolded CLUE exam questions that asked students to explain the change in potential energy associated with the interaction of two noble gas atoms, helium and neon. To analyze these responses, we developed a framework to characterize the causal mechanistic reasoning present in their explanation. This provides us with a window into what the students understand, how CLUE is supporting their learning, and how we might be able to improve the curriculum to better prepare future generations of students learning chemistry.

COST-EFFECTIVENESS OF SCREENING FOR DEVELOPMENTAL DELAYS IN EARLY EDUCATION AND HEALTHCARE SETTINGS
Eric Locker
Education, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 138
Mentor(s): Kristin Rispoli

Between 2006 and 2008, approximately 1 in 6 children were diagnosed with a developmental delay (DD). This represents a 17% increase in reports, or 1.8 million more children with a DD, between 1997 and 2008. The overall increase in prevalence of any DD suggests greater utility in using a screener meant for all types of developmental delays. The Ages and Stages Questionnaires, Third Edition was designed for use by the early education and healthcare fields to detect developmental delays. Cost-effectiveness is a key factor in determining utility of the ASQ-3, given its relevance for organizational stakeholders. This poster presentation will examine the total costs, average cost of referral, and barriers to optimal implementation of developmental screening using the ASQ-3. Participants will include three early

education administrators (participating in a larger study of developmental screening practices) and three employees of demographically-matched pediatrician's offices. Data will be collected through an online survey and face-to-face interviews. Total costs, total number of individuals referred for further evaluation, and average costs of an individual referral in each setting will be evaluated. The results of the study will provide initial evidence into the costs associated with developmental screening programs which can inform future research and practice. Information gathered from the interviews can also be used to identify barriers to screening and encourage further research in how to remedy these barriers and maximize cost-effectiveness of screening in each setting.

ASSESSING CORE GENETICS CONCEPTS: MEASURING STUDENT CONSISTENCY ACROSS MULTIPLE QUESTIONS
Hunter Hicks, Devin Babi
Education, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 139
Mentor(s): Caleb Trujillo, Tammy Long

Biology educators have increased efforts to reform introductory biology courses to teach an in-depth understanding of core concepts rather than isolated facts. However, classroom assessments are largely unchanged and often use multiple choice formats that cover many concepts broadly, but may provide limited insights into students' thinking about core concepts.Our research seeks to answer the following: How consistent is student understanding when elicited across multiple assessments of the same concept? We analyzed student responses (n=199) from a majors introductory biology exam that assessed concepts related to the origin and expression of genetic variation. Using the framework of Vision and Change, we coded student performance for consistency in reasoning across items for the concepts of structure, function and information flow. Our analyses will reveal variation in student reasoning for core genetics concepts when addressed across multiple items in an assessment. Our results have implications for how instructors might design their assessments to focus on a few, high priority concepts rather than many, less relevant ideas.

BUILDING AN ETHICS CURRICULUM: IDENTIFICATION OF ETHICAL ISSUES IN RUSSIAN NURSING - A PRELIMINARY ANALYSIS
Johnny Choi, Johnny Choi
Education, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 140
Mentor(s): Douglas Olsen

This study aims to identify ethical issues encountered by Russian nurses to help construct relevant ethics curriculum in Russian nursing education. Literature explains that bioethics is conceived differently in Russia than US due to historical origins. Additionally, Russia's approach to bioethics is based on differing conceptions of an individual's place in society. Major ethical issues identified among US nurses in prior research include protecting patients' rights and dignity, respecting consent to treatment, and staffing patterns that limit patient access. No similar surveys were identified pertaining to Russian nursing. Semi-structured interviews were conducted with eleven nurses interviewed from two units, Adult cardiology and Child endocrinology. Participants were initially asked about "problems at work" to avoid biasing participants, regarding what constitutes an ethical issue. The participants were also asked to respond briefly in writing to questions. Interviews were conducted in Russian with assistance from an English-speaking consultant. The consultant and interviewer took notes during the interviews which lasted from 15 to 45 minutes. Further interviews are planned. Ethical approval was obtained from MSU and Sechenov University. Initial analysis identified numerous ethical issues such as, low nurse-patient ratios hindering therapeutic relationships, disrupted end of life care, lack of supplies, and prejudice based on socioeconomic status. Early analysis indicates both, overlap and differences in the ethical issues encountered by Russian and US nurses. Therefore, the ethics curriculum in Russia be should include these issues.

TRANSITIONING FROM HANDWRITING TO KEYBOARDING ACROSS GRADE LEVELS
Sydney Aldridge, Quan Zheng, Zihan Li
Education, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 141
Mentor(s): Adrea Truckenmiller

Writing transcription is defined as an important, basic cognitive process that allows writers to translate internal language into external written symbols (Berninger, Abbott, Augsburger, Garcia, 2009). Transcription skills are necessary but insufficient for people to communicate via written language. Transcription occurs via handwriting or

keyboarding. When students are learning to write in schools, some studies suggest that students' handwritten sentences and essays are better than keyboarded sentences and essays because of proficiency with handwriting over keyboarding (Berninger et al., 2009). However, both transcription modes are important for 483 students to learn and other studies suggest that handwritten and keyboarded written responses are highly correlated with one another (Connelly et al., 2007) and that writing proficiency for both transcription modes are equivalent across grade levels (Feng, Lidner, Ji, Joshi, 2019). The purpose of the current study was to extend the previous research by exploring the two different transcription modes for students in grades 3 through 8, where students are expected to give handwritten and keyboarded responses. Student participants completed four tasks: handwriting fluency, keyboarding fluency, handwritten essay, and keyboarded essay. It was hypothesized that both typically-performing and students struggling with writing would be more fluent in handwriting than keyboarding, especially in the lower grade levels. It was also hypothesized that transcription fluency would be significantly related to writing quality for grades 3 through 8.

AN INTERSECTIONAL APPROACH TO ACHIEVEMENT GOAL THEORY: AVOIDANCE GOALS AND ACADEMIC ACHIEVEMENT
Kalli Schabbel, Theo Vanegeren, Trent Garner
Education, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 201
Mentor(s): Amalia Lira, Cary Roseth, Lisa Linnenbrink-Garcia, Jennifer Schmidt, You-Kyung Lee

There is a need for successful science, technology, engineering, and mathematics (STEM) trainees, particularly more women and underrepresented minority students (URM) who are disproportionately represented in STEM. To address this disparity, we draw from Achievement Goal Theory (Dweck & Leggett, 1988), which posits that students endorse performance goals (aims to demonstrate competence) and mastery goals (aims to develop competence) in achievement settings. Research suggests that students who hold mastery goals enjoy learning more than students who endorse performance goals. Moreover, performance-avoidance goals (aims to avoid showing incompetence) and mastery-avoidance goals (aims to avoid not developing competence) have been associated with disengagement, decreased interest, and low academic achievement and performance. Given that women and URM students are disproportionately represented in STEM fields and may face discrimination, and stereotypes, we expect that they will hold high performance-avoidance goals and mastery-avoidance goals and will have lower achievement in STEM courses. In contrast, men and non-URM students may be most likely to endorse lowest levels of performance-avoidance and mastery-avoidance goals. Participants (N = 2,340) were recruited from a gateway chemistry course at an elite university. We will use ANOVA to assess mean differences in performance-avoidance and mastery-avoidance goals across four different groups (44.0% male-non-URM; 2.4% male-URM; 44.3% female-non-URM; 4.4% female-URM; 4.9% missing), and then regression analysis to assess the association of these goals to achievement. The present study has the potential to inform theory and practice by providing an intersectional lens for assessing achievement goal theory and sociocultural factors.

RECONSTRUCTING THE MISEDUCATION OF SEX FOR BLACK GIRLS
China Gross
Education, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 202
Mentor(s): Tamara Butler

In 1998, lyricist Lauryn Hill sang, "And every time I try to be, what someone else has thought of me/So caught up, I wasn't able to achieve." The Miseducation of Lauryn Hill, both the track and the album, marked a moment of Black girl reflection and redefinition. Therefore, this presentation draws upon Hill's redefining moment to think about Black girls redefining themselves, reclaiming their bodies and breaking the cycle of miseducation. In this presentation, I propose a relatable sex education for middle-school aged Black girls (ages 11 to 14). By fusing sex education with popular Black cultural references such as music and media, I ask the following questions: (a) How has past sex education systems failed young Black girls? (b) As a young Black girl, what kinds of information would help my transition into adulthood? (c) How might community members and future educators use popular culture to address some of the topics that are underdiscussed among Black communities?

GENDER-STEREOTYPE, SELF-COMPETENCE, AND ATTAINMENT VALUE: RELATIONS TO FEMALE COLLEGE STUDENTS? ACHIEVEMENT IN STEM
Aubrey Sneed, Becca Koskiewicz
Education, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 203
Mentor(s): Lisa Linnenbrink-Garcia, Cary Roseth , Jennifer Schmidt

Expectancy-Value Theory posits that an individual's expectations of success and subjective task value are directly affected by gender stereotypes informed by the individual's perception of socializers' beliefs (Eccles & Wigfield, 2000). In science, technology, engineering, and mathematics (STEM) fields, females' perceptions of gender stereotype threat may relate to their expectancies and value, which in turn may predict achievement. This study examines the relations of gender-stereotype threat, perceived self-competence, and attainment value to academic achievement using multiple regression. We particularly focus on the attainment value dimension of task value, as these perceptions relate to identity and may be particularly related to gender identity for female students in STEM. To understand these relations, we used data collected from a series of self-reported surveys, with final exam scores used to evaluate achievement. The sample for this study is comprised of female undergraduates (N = 896) taking a gateway chemistry course at a large public Midwestern university. We hypothesize that gender stereotype threat will negatively affect perceived self-competence and attainment value, which in turn predict achievement. We believe that taken together, the empirical evidence will support the theories, pointing to the idea that external expectations of women in STEM negatively predict achievement, which is significant because it demonstrates that women's achievement is hindered by gender-based misconceptions. Further, our findings may suggest supporting expectancy and attainment value would buffer this potential negative relations of gender stereotype threat to STEM achievement.

UNDERGRADUATES' PERCEPTIONS OF COURSE OUTCOMES IN THE DEPARTMENT OF COMMUNITY SUSTAINABILITY
Jack Rumery
Education, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 204
Mentor(s): Michael Everett

Finding quantifiable ways to assess learning by students is critical to help educators craft more effective curriculum and teaching strategies. Student perceptions are important to understand in relation to programmatic learning outcomes. Gaps in perceptions of course learning goals and outcomes may exist and understanding student perspectives are important to making appropriate course and program changes. This study utilized survey research of current student perceptions about learning goals and outcomes of undergraduate students in the Department of Community Sustainability (CSUS). Survey questions sought to better understand differences of perceptions of undergraduate classes as compared to programmatic learning outcomes in those respective courses. There were respondents from all three majors, Agriculture, Food, and Natural Resources Education (AFNRE, n = 18), Sustainable Parks, Recreation, and Tourism (SPRT, n = 6), and Environmental Studies Sustainability (ESS, n = 37). Programmatic outcomes for each undergraduate course are found within 11 thematic areas using a graduated approach to learning within each thematic area (beginning-developing-competent-accomplished). All CSUS majors had an average perceived learning score of individual undergraduate course outcomes above the departmental thematic outcomes (AFNRE = +0.15, ESS = +0.77, SPRT = +1.36). Data for two undergraduate courses (CSUS 200, CSUS 300) suggested that ESS majors displayed significantly higher learning perception scores than the departmental goals in both cases, SPRT majors displaying significant scores in CSUS 200 but not CSUS 300, and AFNRE students showing no significant increase from the departmental outcomes in either case.

HEAD START ON LIFE SCIENCE: ASSESSING EARLY CHILDHOOD SCIENCE EDUCATION
Laurin Schultz, Mia Rodgers
Education, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 205
Mentor(s): Hope Gerde

Science learning interactions and experiences are important in early childhood education. High-quality science education can promote the development of early science reasoning and knowledge of science concepts. Currently, most children receive low-quality science education. To enhance the quality of early science education, the *Head Start on Life Science* (HSOLS) curriculum was created. The current study engages teachers with this newly published curriculum to examine

how teachers' use the curriculum to design quality science education for young children. The study includes two research questions: 1) Which teaching practices do teachers use when they implement self-prepared and HSOLS curriculum supported science lessons in preschool classrooms?, and 2) Do teachers provide higher-quality teacher-child interactions during implementation of a self-prepared lesson compared to a lesson supported by the HSOLS science curriculum? Pre-service teachers through Michigan State University participated in the study. Teachers were video recorded implementing a science lesson they prepared independently and a lesson they developed using the HSOLS curriculum. The lessons were coded for the type of language and science concepts the teachers used. Results will include descriptive analyses depicting teachers teaching strategies when implementing science lessons under both conditions. In addition, ANOVA will be used to compare teachers' practices across these conditions. The discussion will identify recommendations for teacher practice and education as well as curriculum development.

THE UTILITY OF EMPATHY IN CULTURALLY RESPONSIVE INTERACTIONS WITH YOUNG BLACK MEN AND BOYS
Tim Herd
Education, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 206
Mentor(s): Chezare Warren

Numerous studies and research reports document the persistent failure of US schools to adequately educate young Black men and boys. Scholars argue that the application of empathy to classroom interactions with diverse youth is an essential feature of culturally responsive pedagogy, and that empathy has the potential to reverse trends in Black male school failure. The proposed study connects evidence of empathy to examinations of effective teachers' dispositions or trends in observable behavior. Effective teaching, in part, as teachers whose dispositions and professional decision-making with Black male students tend to produce evidence of culturally responsive pedagogy. Through interviews with multiple school stakeholders, focus groups with Black male students, and video-recorded classroom observations of three teachers identified as effective by administrators and students, the ultimate aim of this study is to operationalize the application of empathy in student-teacher interactions with Black boys.

CHILDREN'S WRITING DEVELOPMENT IN PRESCHOOL
Rachel Stadwick, Madison Brodoski, Sarah Jenuwine
Education, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 207
Mentor(s): Hope Gerde

Early writing in children is an important skill that has been positively correlated to later school success (National Early Literacy Panel [NELP], 2008), and a range of early literacy skills (Diamond, Gerde, Powell 2008). Writing, even for young children, includes three components, handwriting (the specific forms of letters), spelling (the connection between letters and letter sounds), and composing (the message or ideas to share) (Kaderavek, Cabell, & Justice, 2009). While most research on early writing development focuses on handwriting and spelling (e.g., Puranik & Lonigan, 2011), work examining teachers' scaffolding of writing demonstrates targeting composing is particularly meaningful for supporting early writing development (Bingham, Quinn, & Gerde, 2017). Unfortunately, current measures of early writing do not include assessment of early composing, until now. This study utilizes a novel early writing assessment (Gerde & Bingham, 2017) to answer two research questions 1) what are the characteristics of young children's writing composition and 2) how does children's oral language output and written output develop throughout the year. 350 children (3-5 years) were assessed on the Gerde & Bingham Writing Protocol (Gerde & Bingham, 2017) in the fall, winter, and spring of their preschool year. Research assistants coded the data using a complex system to examine children's oral language output, written language output and the relation between the oral and written outputs (interrater reliability is .97). Results include descriptive analyses depicting children's composing in the fall, winter, and spring of preschool and an examination of differences across the school year. Implications for future data collection and practice will be discussed.

ANALYSIS OF STUDENT MECHANISTIC RESPONSES FROM ORGANIC CHEMISTRY
August Jarzambek
Education, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 313
Mentor(s): Melanie Cooper

Studies have shown that students have struggle to draw organic reaction mechanisms. We have collected data from students enrolled in a transformed organic chemistry course and traditional organic chemistry course. Student mechanistic drawings for the reaction of I-and (CH3)3CBr are categorized based on the correctness of their responses. The two pathways are a conical pathway where they drew an SN1 mechanism and a non-canonical pathway where it deviated from an SN1 pathway. These deviations will also be characterized. The analysis of these drawings and some preliminary conclusions will be presented.

ANALYSIS OF STUDENTS' EXPLANATIONS OF LDFS USING MACHINE LEARNING TECHNIQUES
Robby Mckay, Matthew Neumann
Education, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 314
Mentor(s): Keenan Noyes, Melanie Cooper

Intermolecular forces (IMFs) are a fundamental concept in chemistry explaining how atoms and molecules interact. In CLUE (Chemistry, Life, the Universe, and Everything), the general chemistry curriculum at Michigan State, a greater emphasis is placed on the structural basis for IMFs. To characterize students' IMF explanations we used a previously developed coding scheme to characterize the level of causal mechanistic reasoning, an important type of scientific reasoning, present in their responses. While this type of analysis would be useful to instructors, because of the size of undergraduate classes, analyzing the vast number of student responses in a timely manner is often too time consuming. The Automated Assessment of Constructed Responses (AACR) group have developed an approach to this problem using machine learning to conduct lexical analysis on a London Dispersion Force formation prompt. In order to accurately assess student responses, many precoded responses are input to "train" the computational models using machine learning algorithms. We have developed a well performing computer model using a single cohort of students, but in order to develop a tool that could be used for other groups, we need to analyze a greater diversity of responses. To do this, we coded three distinct cohorts of undergraduate students to test and improve our current computer model. By making these improvements, we move toward providing a resource that instructors across the nation could use to learn more about the types of reasoning their students use to explain IMFs.

EDUCATIONAL SEGREGATION: HOW RACIALLY RESTRICTIVE COVENANTS AND REDLINING ARE STILL IMPACTING STUDENTS IN URBAN PUBLIC SCHOOLS
Victor Ruiz-Divas
Education, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 315
Mentor(s): Terry Flennaugh

This project addresses the issue of educational inequality between public schools in urban and suburban areas located in Grand Rapids, Michigan. Specifically, this project primarily focuses on addressing the differences in school funding and how this has an impact on the quality of education students receive and the quality of learning experienced in the classroom. The goal of this research is to investigate methods on how to improve the education and quality of learning for students enrolled in urban public schools not only in Grand Rapids, MI but nationwide. For this project, a literature review of both refereed research and mainstream news studies/articles was conducted as well as data collection from four databases. Nine schools in total were observed for this project. The schools are from the Grand Rapids Public Schools and East Grand Rapids Public School districts. The group consisted of elementary, middle, and high schools. Six schools are majority-minority schools and three are predominately white. Data obtained from the four databases show clear and distinct differences between schools in GRPS and EGRPS. Differences include school funding, quality of education, and student academic performances.

UNDERSTANDING AND INTERPRETING SYMBOLS WITHIN ORGANIC CHEMISTRY: MECHANISTIC ARROWS AND REASONING
Macy Lockhart
Education, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 316
Mentor(s): Melanie Cooper, Olivia Crandell, Susan Ravizza

Organic Chemistry is a college-level course that contains many symbols to represent concepts and requires students to problem-solve through reactions using these symbols. Students tend to struggle with this course because the symbols it uses represent abstract ideas, so it can be hard for students to reason through the reactions. However, these symbols are intended to represent understanding of molecular-level concepts. Many studies have identified problems with students' corresponding understanding of these mechanistic symbols (Grove, Cooper, and Cox, 2012). To respond to this problem, a transformed organic chemistry course was designed that places emphasis on reasoning through reactions using knowledge of electrostatic interactions and atomic/molecular structure property relationships and requires evidence of this understanding on exams. In order to compare whether the transformed organic chemistry course teaches reasoning skills more effectively, we have developed a characterization scheme (Cooper, Kouyoumdjian, and Underwood, 2016). We are interested in student engagement in a particular type of reasoning that articulates why and how a reaction happens. Homework responses from comparable cohorts of students from a transformed organic course and a traditional organic course will be analyzed using the causal mechanistic characterization scheme. We will then compare student reasoning to their mechanism arrow use. Based on previous data, it is predicted that students in the transformed organic chemistry class will be able to reason through this reaction more effectively than the students in traditional organic chemistry.

EFFECTS OF SCHOOL CHOICE POLICIES ON MICHIGAN COMMUNITIES
Tanner Thering
Education, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 317
Mentor(s): Corwin Smidt

With policy changes beginning in the 1990's, Michigan's school of choice program participation has expanded. What have been the effects of these policies on the school districts of Michigan communities, and what factors are associated with greater school choice participation within a community? We examine the enrollment rates of 19 communities' public-school districts from 2009 to 2016, a period of slow, and, at times, negative, population growth within Michigan. Reviewing past literature, we examine the effects of school enrollment trends on these communities. Using Michigan Department of Education enrollment data, we estimate the comparative effects of open-enrollment (non-residential district enrollment) and public-school academies (commonly known as 'charter schools') on enrollment in the public-school districts of the central towns or cities of communities. We examine concurrent population, economic, and demographic trends within the communities to find correlations between rates of school-choice participation and other social trends that may amplify or nullify the effects of these policies.

KEEPIN' IT 100: LESSON ON INCLUSIVITY IN STEM
Shantell White
Education, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 318
Mentor(s): Angela Calabrese Barton, ReAnna Roby, Sarah Keenan-Lechel

This study is situated in an after school Informal STEM Learning (ISE) community space in an urban midwest setting. Historically, for minortized people, particularly youth, STEM has not been an inclusive space. As such, access to STEM programming has been limited, as well as engagement in the STEM enterprise. Through entrenchment in an informal science environment focused on critical justice in STEM engagement, I explore the ways in which minoritized youth, engage in STEM and work to make STEM an inviting and inclusive space for their peers and community. The youth in this study actively engaged in co-constructing inclusive places for engaging in STEM by reimagining who and what STEM is for in three main ways. First, the youth engage in practices of remembrance, solidarity, and resistance as they seek to learn and become in STEM in ways that matter to them and their communities. Second, they have actively sought to make their afterschool space more than a place to make or do things in STEM, but one of care and love. Third, the youth's experiences in after school STEM speak to the ways in which Black youth take on STEM and make it their own. In

the process of doing so, the youth take ownership and authority in naming their experiences and sharing their skills in ways meaningful for them. Their work in disrupting and reconstructing power take to task the ways in which whiteness as property, or in this case science, can be deconstructed.

WHO DOES YOUR UNIVERSITY PROTECT?: AN EXAMINATION OF CAMPUS SEXUAL ASSAULT POST, MID, AND PRE SCANDAL
Maysa Sitar
Education, Oral Presentation
Section: 5, 8:30 AM, Mosaic Multipurpose Room
Presentation Number: 701
Mentor(s): Michael Stamm, Amy Bonomi

This paper examines the sexual assault policies and programs from three schools in the Big Ten Conference, a compilation of fourteen relatively large, public universities. The first, Pennsylvania State University, is a school in the post-sexual assault scandal sphere. Having experienced an intense sexual assault scandal beginning in 2011, it adds value to this research because it gives insight into whether or not a university's post-scandal, revised policies are adequate, thoughtful, and survivor-directed. The next is Michigan State University, a university considered mid-scandal. With the traces of Larry Nassar's numerous sexual assaults still hanging over the university, MSU is in the process of reevaluating their policies, programs, and procedures. The final school, University of Michigan, is an institution without a national sexual assault scandal, and whose policies, procedures, and programs have yet to face the considerable pressure such a national spotlight brings. From a thorough evaluation of each of these universities, this paper aims to discuss the effects of such scandals, as well as best practice in handling sexual assault as an issue of priorityon college campuses. The findings suggest that despite little varience in services, an institution changes its presentation behavior when publicly forced to, suggesting that the audience of universities is the public, not the students.

COMPARING SEXUAL MISCONDUCT PREVENTION EFFORTS ACROSS AAU SCHOOLS
Emily Saxon
Education, Oral Presentation
Section: 5, 8:45 AM, Mosaic Multipurpose Room
Presentation Number: 702
Mentor(s): Michael Stamm

All universities across the United States that receive federal funding are required to adhere to several federal laws, such as the Title IX amendment, the Cleary Act, to have a Title IX coordinator, and to implement some form of programming aimed at preventing sexual misconduct. However, there is no uniform set of prevention strategies schools must follow, leading to differences in the strengths of efforts from one college campus to the next. With the aim of motivating improved sexual misconduct prevention efforts at Michigan State University, as well as among Michigan State University's peer schools, nine schools in the American Association of Universities were surveyed on their prevention strategies. The surveys were conducted through phone interviews with a representative from each university, and the survey questions were developed based on recommendations from the CDC for sexual misconduct prevention on college campuses. The surveys uncovered several disturbing inadequacies in the prevention efforts of most schools, most notably low numbers of staff working on coordinating prevention measures, a low number of universities that require students to complete both online and in-person sexual misconduct prevention training, and a low number of schools that have entirely sustainable budgets for prevention efforts. The data gathered from the surveys thus suggests each of these universities, which are large, well-known, and public institutions, can make considerable improvements to their prevention efforts. It is apparent that despite widely available guidance for preventing sexual misconduct, prevention is not as much a priority for many universities as it should be.

DIVEIN
Margo Skornia
Education, Oral Presentation
Section: 5, 9:00 AM, Mosaic Multipurpose Room
Presentation Number: 703
Mentor(s): Cheryl Caesar

I am studying the experiences of first-year students at MSU. This includes freshmen, transfers, and international students. I am looking especially at where they find support at MSU and where support is lacking. The DiveIn website, which I am revamping using the information I'm gathering, is going to serve as an electronic resource for first-year students to use when they have a short question or need more information about MSU. DiveIn will also serve as a place

for students to share their own experiences. I am also particularly focusing on the culture shock that international students, especially students from China, experience. DiveIn will have information about American culture and the way it differs from Chinese culture, as well as resources students can use to find more information. By preparing students who are coming to study in America, I hope we can make their transition easier and less stressful. I will be drawing on my own experiences, especially my experience studying abroad in China. My research is comprised of online surveys and in-person interviews, which also serve as profiles on the DiveIn website. In this presentation, I will guide the audience through the DiveIn website and highlight its features. I also invite the audience's feedback; DiveIn is a living website and should change according to the needs of its demographic.

TOOLS FOR EMPOWERMENT: USING SOCIAL-EMOTIONAL LEARNING FOR THE ACADEMIC AND CHARACTER DEVELOPMENT OF LANSING YOUTH
Ryan Roehler
Education, Oral Presentation
Section: 5, 9:15 AM, Mosaic Multipurpose Room
Presentation Number: 704
Mentor(s): Kevin Brooks

In my presentation, I will discuss how I used the framework of social-emotional learning to construct and run an afterschool program at Willow Elementary in Lansing, MI for youth, grades 1st through 3rd, who have been identified by the school system as needing extra attention. Many of these students struggle with poor living conditions (such as homelessness or an unsafe home environment) and/or have a history of behavioral problems in school. Therefore, the program was designed to instill positive character traits (empathy, inclusion, responsibility, resilience, empowerment, etc.) in these students in order to improve their ability to cope with difficult circumstances, to develop confidence in their abilities inside and outside the classroom, and to allow them to explore who they are (and who they want to become) through creative expression. This was accomplished through weekly sessions in which one of the character traits was focused on, so that the students had the opportunity to define the trait, to see how it relates to their lives, and to share what they learned with others in the program. In doing this, the students were able to take control of their learning and, in the process, increased their proficiency in social-emotional skills that allow them to better regulate their emotions and maintain positive relationships.

THE IMPACT OF CORE-IDEA CENTERED INSTRUCTION ON HIGH SCHOOL STUDENTS' UNDERSTANDING OF STRUCTURE-PROPERTY RELATIONSHIPS
Robby Mckay
Education, Oral Presentation
Section: 5, 9:30 AM, Mosaic Multipurpose Room
Presentation Number: 705
Mentor(s): Ryan Stowe, Melanie Cooper

Atoms and molecules are far removed from students' experience and their behavior cannot be intuited based on macroscopic observation alone. A great many resources needed to understand how the world works at a molecular level must therefore be derived from instruction. Purposeful, evidence-based sequencing and scaffolding of core ideas in chemistry can support students in developing coherent knowledge useful in reasoning about molecular level phenomena. The undergraduate curriculum Chemistry, Life, the Universe, and Everything (or CLUE) serves as an evidence-based prototype of what scaffolded progressions of core ideas might look like for chemistry. Nine teachers worked with the project team to craft a working model of CLUE for high school that is appropriate in scope, well-aligned with the physical science performance expectations of the *Next Generation Science Standards*, and focused on explaining, predicting, and modeling phenomena in terms of atomic/molecular behavior. Four of these teachers piloted the materials we developed in their classroom for the 2017-2018 school year. Our evaluation of HS-CLUE focused on student understanding of structure-property relationships. We examined association between student enrollment in one of three curricula (HS-CLUE, Modeling Instruction, and a traditional course) and their ability to explain the difference in boiling point between two substances in terms of forces and energy.

EFFECT OF INTERDISCIPLINARY EXPERIENTIAL LEARNING COURSES ON STUDENT ACADEMIC AND PROFESSIONAL DEVELOPMENT
Aalayna Green, Caroline Blommel, Storm Miller
Education, Oral Presentation
Section: 5, 9:45 AM, Mosaic Multipurpose Room
Presentation Number: 706
Mentor(s): Robert Montgomery, Jeffrey Grabill

The Hub for Innovation in Learning and Technology strives to better prepare Michigan State University students to become global innovators by developing an active education model, as well as providing space for such innovative courses. Our study sought to identify and quantify the educational benefit of experiential and interdisciplinary learning programs on students' academic and career development. We also sought to explore the influence such a space and active classroom had on the students. These were examined through the experiences of students enrolled in the Snares to Wares Initiative course created by Dr. Robert Montgomery and Ron Iwaszkiewicz. The Snares to Wares Initiative course positions students as business operators and is based on the deliverance of a series of knowledge process outsourcing (KPOs) and defined success for the Snares to Wares Initiative itself. We examined student academic and career development through a survey collection on students' academic performance, career interests, and T-shape professional classification.

EXAMINING INTERNATIONAL STUDENT LEARNING
Yuyang Cai
Education, Oral Presentation
Section: 5, 10:00 AM, Mosaic Multipurpose Room
Presentation Number: 707
Mentor(s): Joyce Meier

Examining international student learning from an "insider" perspective (as someone from China), I have joined a faculty team that is addressing the challenges faced by MSU students like me. In particular, we are looking at the problem of instructors who use disciplinary-specific language and unfamiliar cultural reference in their teaching. We are creating 1-2 videos on this problem and proposing some solutions, for the teach@msu.edu web site. This will be a resource for MSU teachers who work with international students on our campus.

DESIGN AND TESTING OF EMG SENSORS FOR FEEDBACK CONTROL OF A SOFT ROBOTIC EXOSKELETON
Tyler Vanburen, Ishaan Pathak
Engineering Computer Science and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 55
Mentor(s): Thassyo da Silva Pinto, Anthony Doan, Joseph Lucas, Galit Pelled, Xiaobo Tan

Robotic exoskeletons can be useful tools for healthy individuals in physical task assistance, injured patients during rehabilitation therapy sessions, industrial workers for strength augmentation, and to study the neuromechanics and energetics of human locomotion. A robotic exoskeleton with lightweight and flexible lower limb mechanisms controlled by pneumatic artificial muscles (PAMs), allows a smoother and more natural movement pattern, emulating biological muscles. Bioelectrical signals such as surface electromyography (EMG) can be used to infer the operator's intention related to his motion in the form of electrical potential. In this study, we have investigated the design and data acquisition of EMG sensors for potential integration to a robotic exoskeleton. Multiple custom-built EMG circuits were fabricated and compared with off-the-shelf devices while capturing lower limb muscles signals related to walking, crouching, and stair climbing movements. The obtained experimental results demonstrate that EMG technology can be used as an effective body computer interface between the user and the exoskeleton. Further optimizations for this research include adjusting the placement of EMG electrodes and implementing signal processing techniques to improve the sensor readings. Soft robotic exoskeletons with biofeedback have promising applications in workplaces and clinical environments, allowing synergetic control of exoskeleton systems for heavy duty workers and post-stroke patients, while realizing appropriate power assist according to the wearer's intention.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS

ANALYSIS OF LEAD IN TAP WATER USING NANOCHROMATOGRAPHY AND IN-SYRINGE SOLID PHASE EXTRACTION
Alyssa Sanderson
Engineering Computer Science and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 56
Mentor(s): Rebecca Lahr

Currently, methods to detect lead in water are neither low-cost nor user friendly. Nanochromatography methods are under development for low-cost, accessible 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. Early success has been shown in using this method to identify tap water constituents. However, lead occurs at much lower levels in tap water than compounds typically measured with nanochromatography. Thus, nanochromatography alone is unsuitable for the detection of lead. To solve this issue, solid phase extraction (SPE) can be used to preconcentrate the lead before analysis. Several other studies have had success in using various SPE methods to preconcentrate lead before analysis. The issue with these methods, though, it that they often rely on expensive and inaccessible equipment to quantify lead after preconcentration. It is proposed that a cheap, in-syringe SPE method be developed to preconcentrate lead so that nanochromtography can be done on the tap water sample. The SPE method used in this study will involve low-cost plastic syringes and Chelex-100 resin.

MONITORING WATER QUALITY USING MAGNETIC NANOPARTICLES
Zach Tonnerre
Engineering Computer Science and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 57
Mentor(s): Evangelyn Alocilja

Globally, over 2 billion people consume water that has been contaminated in some way by feces, whether human or animal. The United Nationes puts sustainable access to clean water around the world as one of the Millennium Development Goals . The threat of contaminated drinking water lies mainly in the risk of contracting diseases, and the subsequent negative health impact. An estimated 500,000 people die annually from diarrheal infection due to drinking contaminated water. Thus, there is a need for quick and accurate testing methods for water samples to help people determine if it is safe to consume. The development of magnetic nanoparticles, or MNPs, has allowed for rapid separation of bacteria in a sample, resulting in a concentration effect that allows for a more accurate measure of bacterial load. Subsequent plating on a species-selective media allows for specific count of bacterial Colony Forming Unit, through isolated growth of different species of bacteria, such as bile agar for *Escherichia coli*or Thiosulfate-citrate-bile salts-sucrose, or TCBS, agar for *Vibrio*species. This results in a more accurate count of the present bacteria, as bacterial growth on standard Tryptic Soy Agar (TSA) plates was also covered by fungal growth. Furthermore, this represents a method of testing that is cheaper than most methods, and also doesn't require any specific training, while allowing more versatility in testing.

COMBINING METADATA, TRANSCRIPTOMES AND GENES TO ANNOTATE BIOLOGICAL CONCEPTS ON A LARGE-SCALE
Marc Maldaver
Engineering Computer Science and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 58
Mentor(s): Arjun Krishnan

The field of computational biology continues to grow rapidly and heavily relies upon significantly large amounts of labeled data to build informative models. These datasets can be rare to come by and may have to be manually curated, which is cumbersome and labor-intensive. We attempt to solve this issue by combining metadata with gene expression data to create logistic regression models that can accurately label samples utilizing ontological terms. The metadata is processed with neuro-linguistic programming methods to maximize accuracy and assist bioinformaticians with moving past this bottleneck in their research.

MONITORING NUTRIENTS IN SYNTHETIC HYDROLYZED URINE DROPLETS USING NANOCHROMATOGRAPHY
Zoe Wilton
Engineering Computer Science and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 59
Mentor(s): Rebecca Lahr

Urine contains the bulk of the nitrogen and phosphorous in waste water. To utilize these nutrients, a urine diversion reactor has been built to recover nitrogen and phosphorous to use as fertilizer. A method is under development to monitor nutrients through the reactor using nanochromatography separation, also known as the "coffee ring" effect. Nanochromatography employs the coffee-ring effect, to produce residue "fingerprints" that are left behind when water droplets are dried. We hypothesize that these "fingerprints" have unique residue features that can be correlate to

different ion concentrations. To better understand the effects of different solution components, the composition of a synthetic hydrolyzed urine solution was altered systematically (total ammonia nitrogen concentration, the presence or absence of magnesium chloride, chloride versus bicarbonate, pH, sodium chloride concentration). Using an aluminum slide, pipette, jeweler's loupe, and cell phone camera images can be taken of these fingerprints and then analyzed. Particle analysis, using ImageJ, was used to determine associations between features in the residue patterns and concentrations of specific ions. The identity of specific features in the residue patterns were evaluated using Raman spectroscopy. Results showed that the fingerprints displayed visual differences when the concentration of specific ions was altered.

RELATIONSHIP BETWEEN RESIDUAL STRESS AND HYPERTENSION IN LEFT VENTRICLES THROUGH OPENING ANGLE TESTING
Ari Hollander
Engineering Computer Science and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 60
Mentor(s): Sara Roccabianca

Residual stress is defined as the stress that is present in the absence of any external load. Although this area of interest has been explored before, only recently researchers have focused on understanding the biological effect of these stresses, specifically in the left ventricle (LV). The variation of collagen fibers content within a soft tissue seems to be a key component affecting the magnitude of residual stress. Hypertension, as observed through histology, results in an increase in collagen within the LV. Opening angle tests were done on hypertensive rats fed a control diet, hypertensive rats fed a high fat diet, decellularized hypertensive rat hearts, and healthy rats to study this connection. The hearts were dissected and latitudinal cuts were made to form ring-shaped samples. Once ready for testing after being treated with a detergent, a radial cut opposite of the right ventricular wall was performed and pictures were taken at various time intervals to qualitatively measure the residual stress by analyzing the opening angle of the heart; the greater the opening angle, the more residual stress present. It was found that all hypertensive samples had a lower opening angle than the healthy samples, which concurs with other studies. This is possibly due to the remodeling of collagen as a result of hypertension, as well as an interaction between the collagen and myocytes.

EFFECTS OF MORPHOLOGICAL CHANGES ON HEMODYNAMICS IN AORTIC-FEMORAL ARTERIES OVER TIME
Luke Chrisman, Erin Bosman
Engineering Computer Science and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 123
Mentor(s): Seungik Baek

An abdominal aortic aneurysm (AAA) refers to a focal dilatation of the abdominal aorta, affecting about 5% of elderly men in the US. Even with vast increase in understanding of AAA pathology and advances in biomedical imaging and biomechanical analysis, rupture of AAAs continues to cause a high rate of mortality. It has been shown by multiple studies that wall stress estimated by using patient-specific geometries predicts rupture better than the maximum diameter does. Because of this, we focus on longitudinal medical image-based geometric modeling and simulation of abdominal aortic aneurysm growth. We want to look at the influence of hemodynamics during the progression of aortic aneurysms, and to do so, we take sequential images of the same person, create models for them, and compare the hemodynamic features over time.

APPLICATIONS OF NANO-CRYSTALS AND SCANNING ELECTRON MICROSCOPY
Katie Perdok
Engineering Computer Science and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 124
Mentor(s): Carl Boehlert, Per Askeland

Nanoparticles are microscopic particles that range in size from 1-100nm. Nanoparticles have applications in many fields of science and engineering, including in medicine. Multiple properties of nanoparticles are studied using scanning electron microscopy (SEM). In order to study nanoparticles in the microscope, they are embedded into polymers. The samples used in this study contained iron oxide nano-crystals embedded in cellulose triacetate polymer. Iron oxide particles are currently being studied for applications in MRI tracking. The SEM captures images of the surface of samples. These images are used to determine the size of the nanoparticles. Images taken from the SEM also show some structural

components of the sample, as well as relative densities within the material. The scanning electron microscope is also used for chemical analysis to determine the composition of the material. Samples with varying nano-crystal concentrations were observed in the SEM.

SYNTHESIS AND CHARACTERIZATION OF BIO-BASED POLYOLS AND POLYURETHANE FOAMS PRODUCED THEREFROM
Sara Kolar
Engineering Computer Science and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 125
Mentor(s): Ramani Narayan, Sayli Bote

Polyurethanes are a versatile material and used in a variety of applications e.g. insulation, automotive, building & construction. It is made by reacting isocyanate and polyol. Isocyanate groups react with hydroxyl groups from the polyol to form urethane linkages. There has been an increase in the use of biobased polyols due to its ability to reduce carbon footprint. This biobased polyol alternative replaces non-renewable polyols produced from petroleum feedstock. Our work focuses on the use of polyols derived from soybean oil for applications in polyurethane foams. Biobased polyols were characterized for hydroxyl value, acid value, and viscosity. The hydroxyl value corresponds to how many OH groups are present within the material. As urethane linkages are rigid in nature, a lower hydroxyl value polyol gives flexible foam whereas higher hydroxyl value polyol gives rigid foam. The acid value must be determined since it affects the determination of the hydroxyl value. Viscosity of the polyol also plays a role in its potential applications. The polyol in this work contained primary hydroxyl groups whereas some other soybean oil polyols available in the commercial market have secondary hydroxyl groups. Primary hydroxyl groups have a higher reactivity towards isocyanate. When polyol is reacted with isocyanate, a gelling reaction and blowing reaction occurs simultaneously to form a polyurethane foam. In the current work, flexible polyurethane foams were synthesized from soybean oil-based polyol and tested for compression strength, tensile, tear, and thermal properties for automotive applications.

FORMATION AND CHARACTERIZATION OF THE SMXMG3-XSB2 SYSTEM
Mack Marshall
Engineering Computer Science and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 126
Mentor(s): Alexandra Zevalkink, Sevan Chanakian

In recent years there has been renewed interest in Mg_3Sb_2, which forms in the $CaAl_2Si_2$crystal structure due to its high performance as an *n*-type thermoelectric material. Motivated by reports of superstructuring, and in an effort to explore the Mg_3Sb_2system further, Samarium was substituted on the cation site. $(Mg,Sm)Mg_2Sb_2$is the only material with the $CaAl_2Si_2$structure reported to form a superstructure. While the traditional $CaAl_2Si_2$structure is formed by layers of cations sandwiching $[Mg_2Sb_2]^{2-}$slabs, the superstructure alternates between ordered $Mg^{2+}$and Sm^{2+}cation sheets, thus increasing the number of atoms per unit cell by a factor of two. Increased number of atoms per unit cell is associated with decreased thermal conductivity due to increases in the number of phonon modes. Understanding why this superstructure forms will provide insight into bonding in analogous materials and a possible avenue into engineering the thermal properties of the $CaAl_2Si_2$crystal family. Interestingly, the lattice parameters of the $(Mg,Sm)Mg_2Sb_2$superstructure deviate from the expected values following Vegard's Law. In order to explore the bonding nature in the superstructured $CaAl_2Si_2$crystal system and understand the effects of superstructuring on the thermal and mechanical properties, the series $(Mg_{1-x},Sm_x)Mg_2Sb_2$(x= 0.25, 0.5, and 0.75) has been synthesized. Here the chemical characterization and elastic moduli of this series are presented. Furthermore a discussion into the lattice distortions is provided by accounting for bond lengths between cation sheets.

LUMPED-PARAMETER MODEL FOR THE PULMONARY ARTERIAL TREE AND ITS APPLICATIONS IN HEMODYNAMIC SIMULATIONS WITH LOW UNCERTAINTY LEVELS
Josue Natarenmoran
Engineering Computer Science and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 127
Mentor(s): Hamidreza Gharahi, Seungik Baek

Pulmonary arterial hypertension is a lethal disease that affects millions of lives around the world. The pulmonary arterial hypertension (high elevated blood pressure) is caused by different factors that affect the anatomy and physiology of the basal parameters of the pulmonary arterial tree, like thickness, size, stiffness, and other parameters alike. Even though hospitals and clinicians nowadays use medical imaging and pressure measurements, these techniques are insufficient in determining more information about the progression and development of the disease itself, specially the physiological changes in the downstream vasculature (which are too small to be appreciated properly in CT scans and MRI's). In addition to that, many computational models are still being developed to understand the hemodynamics of the pulmonary tree, but the uncertainty levels still need to be improved because of the complexity and size of the downstream generations leading to the capillaries. This study presents a lumped-parameter model of the pulmonary arterial tree which provides hemodynamic parameters like Pressure and Flow up to N number of generations. This can be very helpful in determining the optimal number of generations needed in simulations of low-fidelity and high-fidelity models to obtain physiologically accurate values. The uncertainty of the results can be obtained, and the parameters can also be used in more complex models as boundary conditions. This method was tested in CRIMSON for vasculature segmentation. This can lead to a better understanding of hypertension, and in the future, a possible cure for it.

PROJECT INSIGHT:THE CHALLENGES OF DEVELOPING RESEARCH TOOLS IN ACTIVE AND RESPONSIVE OPEN SOURCE COMMUNITIES
Ty Buckley, Hattie Pimentel
Engineering Computer Science and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 128
Mentor(s): Dirk Colbry

Scientists often gather observations of the world using images and need efficient image annotating tools to extract data from these images. For instance, biologists interested in understanding the joint motion of an iguana might record a video of the iguana, and then select points in the iguana's knee joints frame-by-frame. Project Insight seeks to make this process easier and quicker. The project consists of two parts: first, an image annotation package, the Graphical User Interface (GUI); and second, behind-the-scenes machine learning. When Project Insight is completed, data from the GUI will be sent to the machine learning component, which will attempt to anticipate the user's next choices. The machine-learning component will search through algorithm space for the most suitable algorithm. Jupyter Notebooks are an interface used by researchers to combines code, pictures, notes and other multimedia. Using Jupyter Notebooks, several image annotation tools were created. Currently, the image annotation tools are being moved to a future replacement of Jupyter Notebooks: JupyterLab. Citing security concerns, the JupyterLab team blocked key JavaScript execution in the beta version of JupyterLab. This means that many programs that worked in the original Jupyter Notebooks, including most of the Project Insight programs, are not functional in JupyterLab. This presentation will cover multiple attempts to retaining functionality in JupyterLab and discuss why the JupyterLab's security block hinders functionality and contrasts the accessible theme of JupyterLab.

A COMPUTATIONAL INVESTIGATION OF THE MOUSE GENOME
Heather Noonan
Engineering Computer Science and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 129
Mentor(s): Kevin Liu

One of the many applications of computational biology and bioinformatics is being able to take sequences of DNA and infer their ancestry using statistical models of evolution. These models can be used to deduce a hypothetical phylogenetic tree, describing the path of evolution from their most recent common ancestor, as well as relationships between the sample of genetic sequences. This is often done through a method called maximum likelihood estimation. Given a sample of observation sequences from a population, this method aims to estimate the parameters of the statistical model, in this case the process of evolution, that resulted in the given query sequences. In order to come up

with the most accurate inferred path of evolution, multiple samples, all modeled after the original query sequences are generated, and the process of maximum likelihood estimation is repeated for each sample, resulting in many theorized tree structures. Each tree is then assigned a supporting value via bootstrapping that describes how similar it is to the other inferred phylogenies. This project utilizes this process to examine full genomic sequences of three sub species of the house mouse: *M.m. domesticus*, *M.m musculus*, and *M. spretus*across different locations throughout Europe and Asia. Random samples were pulled from each geographical region, and then the evolutionary relationships along single nucleotide polymorphisms were examined in hopes of uncovering information on introgression among the subspecies, including the identification of driver genes, as well as genes essential to fitness.

THE MATERIAL AND COMPOSITION OF TENNIS RACKET STRINGS
Hunter Long
Engineering Computer Science and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 130
Mentor(s): Carl Boehlert, Per Askeland

Tennis racket strings are designed with many different factors in mind, ranging from how the strings impact the ball to how the strings affect the player holding the racket. Because of this, the material and composition of tennis racket strings is very important. Tennis strings can be made from a wide variety of materials including animal gut, nylon, polyester, Kevlar, or even a combination of materials. The composition of tennis strings also plays a role. Tennis strings can be as basic as just single strings, known as monofilament strings. Multiple strings can also be wrapped and braided together to create multifilament strings. There are also tennis strings with a solid core wrapped in other materials, as well as strings designed to have a certain texture. The materials and composition of tennis strings can be viewed under a scanning electron microscope. This research will examine tennis strings and the purpose of using certain materials or compositions.

EVALUATING THE EXPOSURE RELATED TO FOODS CONTAINING CHOLESTEROL OXIDATION PRODUCTS USING DIETARY INTAKE MODELING
Esha Jain
Engineering Computer Science and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 131
Mentor(s): Jade Mitchell

Cholesterol is an important element in animal food products. Its unsaturated structure and vulnerability to oxidation, produces cholesterol oxidation products (COPs). COPs-containing foods have been connected to chronic and degenerative diseases, like obesity, Alzheimer's disease and heart disease. Both the compounds formed, and the concentration of those compounds are impacted by the type of food processing including pasteurization and cooking methods in addition to the amount of cholesterol in the raw commodity. To better understand exposure to COPs associated with processing, a literature review on the occurrence and concentration of COPs in major food products consumed within the United States population was created. Using the U.S. EPA's Stochastic Human Exposure and Dose Simulation Model (SHEDS-HT) model, dietary exposures were determined across demographic groups within the population. Determining these exposure levels will provide useful information to support risk assessments and risk management strategies including processing guidelines for these unintentionally formed compounds. Furthermore, guidelines for levels of consumption of certain foods can be ascertained from a holistic perspective of total COP exposure across the diet. Future work in this area, includes development of an extensive database of COPs for cholesterol containing foods and food ingredients based on the processing method. Preliminary results show that frequently eaten foods processed at high temperatures like pasteurized yogurt and French fries contribute the most to COP exposures across the U.S.

EVALUATING SOLUTIONS TO HOSTING COMMUNITY MAINTAINED MATERIALS WITH CONTENT MANAGEMENT SYSTEMS
Tj Nguyen
Engineering Computer Science and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 132
Mentor(s): Dirk Colbry

This research compares several solutions to develop a website to host and share community maintained OpenSource educational materials as part of a NSF funded training grant. The goal is to build a system that is easy for instructors to explore, find and modify content to fit their needs. Any modified content should be easily shared back with the community. At the same time the content should be secure and easy to maintain. Instead of recreating the wheel, this research explored the possibility of slightly modifying existing Content Management Systems (CMS). The CMS are categorized using some of their basic attributes (ex: static/dynamic, OpenSource/proprietary, local/remote hosting) and then evaluated based on their usability, security and ease of maintenance. More specifically, this work looks into multiple static site generators and put together templates and prototypes using Jekyll, Pelican and comparing them to dynamic systems such as, Wordpress and Drupal. No CMS is perfect and thus a solution should be selected based on the design criteria and goals of the individual website. However, many areas of education could benefit from a common, easily adapted CMS focused on education materials. This work attempts to identify and provide instructions to quickly develop such a system tailored to the needs of the individual communities.

EVALUATION AND FEASIBILITY OF 3D PRINTED MOTORS
Shubham Shedge, Josh Ward
Engineering Computer Science and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 133
Mentor(s): Thang Pham, Shanelle Foster

Efficient energy production and consumption are beneficial for environmental sustainability, economic growth and energy security. Electric motor driven systems account for at least 43% of the global electricity consumption. Improving the efficiency of electric motors can positively impact our environment. However, production of new low-cost, reliable and highly efficient motor designs are often bottlenecked by manufacturing realities. The flexibility in size and shape enabled by 3D printing technologies can potentially revolutionize electric motor manufacturing and make realization of the next-generation motor technology possible. In this project, a 3D printed motor is experimentally tested to extract its characteristic parameters and evaluate its performance. Results of this work will guide further development of soft magnet materials for fused filament fabrication, one of many 3D printing technologies that researchers are exploring for development of the next-generation electric motors.

CHEMICALLY-MODIFIED BIOCHAR AS PHOSPHORUS SORPTION MEDIA IN AGRICULTURAL TILE DRAIN WATER
Kiran Lantrip
Engineering Computer Science and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Ballroom
Presentation Number: 134
Mentor(s): Steven Safferman

Excess phosphorus entering water systems is an issue of growing importance in the United States, with the rise in high-profile cases of eutrophication bringing this issue to the public eye. Conditions leading to cases like the devastating 2011 algal bloom in Lake Erie are showing no signs of subsiding any time soon, creating a new sense of urgency to find suitable treatment measures (Michalak et al., 2013). Agricultural practices are one important source contributing to eutrophication. Even with treatment measures in place to control factors such as fertilizer runoff, there will always be some losses through drainage waters. The Michigan Corn Growers' Board has funded this project to assess the potential of different media for phosphorus sorption in tile drains. The focus of this presentation will be assessing the treatment viability of two different chemically-modified biochars: one derived from MgCl2 and CaCl2-soaked corn cob, and the other from FeSO4-soaked corn stover. Media produced using methods adapted from literature are assessed through isotherm testing and then, if successful, a column study.

SELECTION OF THE FEEDSTOCK SOURCES FOR CO-DIGESTION WITH BIOSOLIDS
Matt Wholihan
Engineering Computer Science and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 208
Mentor(s): Steven Safferman, Umesh Adhikari

Wastewater treatment plants produce large quantity of biosolids which can be anaerobically digested for generating bio-gas, a renewable energy source. Biosolids are rich in nutrients but low in readily degradable carbon, and thus have low potential of bio-gas generation. Hence, there is a potential for increasing the energy yield of anaerobic digestion of biosolids through co-digesting with other substrates which are rich in readily degradable carbon. Community food waste presents a readily available substrate that has high energy potential for anaerobic digestion. To understand the potential of co-digestion, multiple Biochemical Methane Potentials (BMPs) assays were conducted and the results were compared. First, primary biosolids, secondary biosolids and multiple different combinations of primary and secondary biosolids collected from the Detroit Wastewater Treatment plant were anaerobically digested to identify the best blend of biosolids. Next, the best blend of biosolids were co-digested with food waste and food processing waste collected from multiple sources to understand the co-digestion potential of the biosolids. Finally, he amount of bio-gas produced feedstocks were compared with the amount of bio-gas produced from primary and secondary biosolids to determine the synergistic and antagonistic effects of using community food waste and food processing waste as an additional substrate for co-digestion.

CLAY CRAVINGS IN PREGNANCY AND CHILDHOOD IN THE GAMBIA
Nyimasata Danjo
Engineering Computer Science and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 209
Mentor(s): Carl Boehlert, Per Askeland

I have always wondered why at home, most pregnant women and children have high cravings for a local type of clay soil. The soil in its natural form is whitish-to-brownish color with a very pleasant smell. Pregnant women buy this soil from local markets and/or dig it up from its sources where it is available. Children, to be precise, almost always eat all kinds of soil available to them between the ages of 6 months to weaning (2 years). In the worst cases, some children get so addicted to eating clay and other kinds of soil for over extended periods of their childhood if not “weaned off” by their parents at an early stage. My research with the Scanning Electron Microscope focused mostly on conducting elementary analysis using the X ray function of the SEM. I used platinum coating to make the soil conductive and I was able to visualize the composition of the soil, made analysis of percentages of some elements and was able deduce some questions. One of these was, does the high iron content of the clay soil have any relationship with the iron needs during pregnancy and childhood? Physiologically, the body will communicate insufficiency of nutrients through sickness and/or food cravings that is, the body can make an iron deficient body to crave for iron rich materials (foods), and at the same the body could be signaled via pathology, so one consciously knows that something is wrong!

ACCESSIBILITY OF JUPYTER FOR VISUALLY AND DEXTEROUSLY IMPAIRED INDIVIDUALS
Asha Shekar
Engineering Computer Science and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 210
Mentor(s): Dirk Colbry

Jupyter is an open-source programming environment that uses “literate programming” by combining documentation, coding and visualization into one file format. The Jupyter notebook format is also particularly well-suited for learning environments, where the instructional content (text, links, videos, etc.) can be combined with executable code and student output (graphs, charts, solutions, feedback) in a single, easy-to-use, file format. Unfortunately, Jupyter software is not fully accessible. This means individuals with impaired senses and abilities may not be able to interact with Jupyter effectively. MSU is leading an initiative working towards making Jupyter more accessible. In this project, I investigated the different accessibility issues with Jupyter and identified key problems that, if fixed, would provide an improved experience for the greatest number of our students. This project made progress in solving two key issues; 1) automatically identify and measuring color contrast across the entire graphical user interface and 2) identify structural edits to the source code that can be made to improve the overall readability for screen readers.

NANO-ENGINEERED SORPTION MEDIA TO REMOVE SOLUBLE PHOSPHORUS IN AGRICULTURAL TILE DRAIN WATER
Megan Curtin, Jessica Hauda
Engineering Computer Science and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 211
Mentor(s): Steven Safferman

Soluble phosphorus pollution in fresh water results in eutrophication that damages the environment, human health, tourism, and property values. Agricultural tile-drain water has been identified as a substantial source of soluble phosphorus pollution in fresh water, and minimal management practices thus far have been implemented to reduce it. To address this issue, this study conducts analyses on two media engineered to adsorb soluble phosphorus from tile drain water, with the ultimate goal of identifying the adsorption capacity of each media. The MetaMateria PO_4Sponge and the FerrIX? A33E media are both nano-coated media that use recycled iron filings as their main adsorption mechanism. A column study consisting of five columns was performed to measure the chosen media's phosphorus sorption capacities in both real and synthetic tile-drain water. Influent and effluent phosphorus concentrations were analyzed biweekly to monitor adsorption over time. The chosen media will be evaluated to determine if they are economically feasible options to reduce nutrient pollution in freshwater. In addition, both medias have the capacity to release the adsorbed phosphorus, which is a valuable and finite resource, to be reused for fertilizer or other practices.

TREATMENT OF WINERY WASTEWATER BY A VERTICAL FLOW CONSTRUCTED WETLAND FOR NITROGEN REMOVAL
Rachelle Crow
Engineering Computer Science and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 212
Mentor(s): Steven Safferman, Katelyn Skornia

This research investigates the effectiveness of microbials and sorption media in vertical flow constructed wetlands (VFCW) to remove nitrogen from winery wastewater. Though bacteria in VFCWs have proven to nitrify wastewater well, there is concern that after long periods of no flow, as seen in the winery industry, the nitrifying bacteria need an extended period of time to reactivate. To treat the nitrogen in wastewater while the nitrifying bacteria is dormant, enhancements need to be added to the constructed wetlands. Enhancements added in this study are clinoptilolite to complete ammonia sorption and tire chips and oyster shells to complete nitrate sorption. Indicator tests such as nitrate, ammonia, alkalinity, and pH are run regularly on the wastewater at various locations in the bench-scale constructed wetland to measure at what point nitrification and denitrification begins to naturally occur by the bacteria and to test the effectiveness of the sorption media. The results of these experiments and their implications will be discussed at this poster presentation. The findings of this research will add information to the conversation regarding the treatment of winery wastewater prior to water discharge to drain fields and croplands.

YOU CAN'T RECYCLE THAT: SEEKING A SOLUTION TO THE STYROFOAM PROBLEM
Kelli Weigold
Engineering Computer Science and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Ballroom
Presentation Number: 213
Mentor(s): Michael Rich, Lawrence Drzal

Expanded polystyrene, or "styrofoam" as it is commonly known, is a popular choice for single-use containers due to its low density and insulating properties. Unfortunately, there is currently no well-established and economical route to recycle polystyrene. Most of it ends up as litter, in a landfill, or incinerated, all of which release toxic chemicals into the environment. The purpose of my research is to identify a possible means for repurposing polystyrene, namely, by using it as a toughening agent in epoxies and other polymers. Epoxies are widely used in various applications, such as in car parts and in construction. Therefore, with a green, inexpensive way to incorporate polystyrene into epoxy and improve its mechanical properties, much polystyrene waste could be redirected, and some negative environmental impact could be avoided. In an attempt to achieve this goal, I pursued various routes of polystyrene incorporation, including solvation in various mediums and particle size reduction. Tests measuring tensile strength of the polystyrene-impregnated epoxy were then performed and analyzed. In this presentation I will review the methods used to incorporate the polystyrene into the epoxy, evaluate the success of each method, and propose recommendations for future work. For the sake of our environment, an alternative route for post-consumed polystyrene needs to be created and broadly applied.

PARTIAL GAIT ANALYSIS OF THE LOWER LIMBS
Paige Cordts
Engineering Computer Science and Mathematics, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 214
Mentor(s): Tamara Bush

Robotic exoskeletons are a relatively new field of biomechanics that is growing rapidly. With practical applications such as walking rehabilitation or as a supplemental tool for first responders to augment strength and movement times, exoskeletons are a promising frontier for biomechanics. One of the more important aspects of an exoskeleton for both rehabilitation and augmentation is the effect it has on the user's gait. If the exoskeleton deviates a healthy individual's gait from what is considered normal, e.g. hyperextension of the knee or ankle, it may be doing more harm than good in practical application. In this experiment, a healthy, unaided individual and the same individual wearing a lower-limb exoskeleton provided by the Strength Augmenting Robotic Exoskeleton (STARX) team on campus were recorded using a Qualysis motion capture system during normal gait and a deep squat. Knee angle, ankle angle, and pelvic rotation were measured at the heel strike, midstance, and toe off phases of the gate cycle as well as in the fully seated and fully extended positions of a squat. We expect to see similar angles between the unaided individual and the individual wearing the exoskeleton, although we may see smaller movement of the ankle while wearing the exoskeleton due to added rigidity.

THREE-ARM POLY (EPSILON-CAPROLACTONE) POLYMERIZATION USING TWIN-SCREW EXTRUSION
Nathan Arnold
Engineering Computer Science and Mathematics, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 215
Mentor(s): Ramani Narayan

Using a twin-screw extruder, three-arm poly (ε-caprolactone, reactive extruded) (REX-PCL) was polymerized in bulk. Extrusion PCL polymerization has several advantages over batch PCL polymerization, including lower residence time, better heat and mass transfer, and synthesis in the absence of any solvents. Using aluminum tri-sec butoxide (ATSB) as a catalyst, the monomer and catalyst were fed using separate peristaltic pumps into a nitrogen purged extruder. Emphasis was placed on optimizing heat zone temperatures, screw speeds, and feed rates to achieve a very high molecular weight product with maximum monomer conversion. A screw configuration composed entirely of conveying elements was found to be most effective. The synthesized polymer, after passing through a cooling bath, was fed into a pelletizer, creating a continuous process from monomer to pellet that is necessary for large scale production. Using thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC), the synthesized polymer was characterized. Gel permeation chromatography (GPC) analysis found the average molecular weight of each arm to range from 30,000 to 200,000 g/mol. Monomer conversions in excess of 95% were achieved, along with the necessary extruder configuration to produce PCL continuously in bulk.

REMOVAL OF CARBON DIOXIDE WITH NITROGEN GAS IN CUCUMBER FERMENTATION
Aleah Hahn
Engineering Computer Science and Mathematics, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 216
Mentor(s): Steven Safferman, Corrine Zeeff , Anna Raschke

The USDA estimates 30 to 40 percent of the U.S. food supply is wasted. Preserving excess produce via brining not only diverts waste from landfills and wastewater treatment systems, but it also adds value to the product. Previous studies have shown that a bag-in-box technology for brining cucumbers is well suited for small quantity applications and enables a low salt process which in turn allows the brine from fermentation to be used in the finished product. Brine reuse reduces washing and prevents the production of high salt wastewater. The objective of this research is to investigate the potential implementation of the bag-in-box technique for brining cucumbers at an industrial scale for growers, processing facilities, and retailers. The aim of this study is to prepare an engineering design that would replace the blanching and cooling steps with a nitrogen blanket and purging system to help discourage growth of unwanted microbes and remove carbon dioxide formed during fermentation by creating anoxic conditions. Laboratory studies are being conducted to find the optimal rate of nitrogen flow into the system to purge carbon dioxide. Carbon dioxide must be kept at a safe level to prevent formation of hollow pockets within the cucumbers which decrease their value.

ANALYSIS OF THE STRUCTURE OF SPIDER SILK USING A SCANNING ELECTRON MICROSCOPE
Nicholas Peters
Engineering Computer Science and Mathematics, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 217
Mentor(s): Carl Boehlert, Per Askeland

The most common applications of materials science research include designing materials that are stronger, lighter, and cheaper than current technology. Spider silk has been considered as an alternative to traditional synthetic fiber materials. This protein-based biomaterial has a very high tensile strength and remarkably low weight. Spiders produce a combination of high-strength, crystalline amino acid sequences and weaker, more flexible ones. These proteins combine to create a strong and flexible fiber. A scanning electron microscope was used to study the structure of several silk samples. Tears in the fiber revealed dense combinations of individual strands. Both the materials used to create these strands and their physical structure could potentially be incorporated into synthetic materials to improve strength and flexibility.

MECHANICAL AND OPTICAL PROPERTIES OF SILICON NANOPARTICLES/ PDMS COMPOSITES
Brant Toback
Engineering Computer Science and Mathematics, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 218
Mentor(s): Rebecca Anthony

Silicon-based organic polymers, known as silicones, provide interesting new level of devices stretchable electronics for daily life and industry purposes. Luminescent materials such as nanocrystals are dispersed within the polymers for optical absorption and emission effects. Creating these composites needs a dedicated study on mechanical behavior of the nanocrystal/polymer systems. Focusing specifically on polydimethylsiloxane (PDMS), some groups have observed that composites of luminescent silicon nanocrystals (SiNCs) and PDMS exhibit altered elastomeric mechanical properties due to reduced cross-linking sites available during PDMS curing. First, synthesized hydrogen-terminated SiNCs via an all-gas phase, non-thermal plasma reactor with silane, argon, and hydrogen as reactants. Then surface-functionalized the SiNCs via thermal hydrosilylation within an air-free environment using a Schlenk line. 1-dodecene is the functionalizing ligand to probe the effects of alkyl chain length on the mechanical properties of the resulting PDMS/nanocrystal composites. These functionalized nanocrystals were suspended and dispersed within the PDMS pre-polymer solution, cured, and cooled. The optical properties of the composites were characterized using photoluminescence spectroscopy (PL) and confocal laser spectroscopy microscope (CLSM) combined with histological techniques to understand the distribution of the SiNCs within the PDMS matrix. Then evaluated the mechanical behavior of the composites using uniaxial tensile testing to determine the elastic modulus of the composite systems. Next, a homogenization model is used to understand how altering the surface of silicon nanocrystals impacts the mechanical properties of the composite. The results have implications for predicting the behavior of polymer/NC systems, pointing towards creating novel stretchable and flexible devices and sensors.

COMPARISON OF OXYGEN, NITROGEN, AND AIR PLASMA ACTIVATION OF BIOCHAR
Brad Luzenski
Engineering Computer Science and Mathematics, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 219
Mentor(s): Qi Fan

Biochar is a porous carbon derived from biomass pyrolysis and is attractive for energy storage in supercapacitors. In order to be an effective electrode material, biochar requires activation. Plasma activation offers an effective, low-temperature alternative to conventional chemical activation. This study compares the effects of oxygen, nitrogen, and air plasma treatment of biochar. All three plasma treatments create a rough, porous surface, with surface roughness increasing over time. Nitrogen-treated biochar experiences minimal mass loss, which does not depend on treatment time; oxygen- and air-treated biochar experience a time-dependent mass loss, increasing to a maximum of 24% mass loss at 20 minutes treatment time. Air plasma treatment is as effective as oxygen treatment, both resulting in a specific capacitance increase of 18%, while nitrogen plasma is less effective, inducing a specific capacitance increase of 15%. Air-treated biochar has the lowest series resistance (~5 Ohm), followed by nitrogen (~8.3 Ohm) and oxygen (~12 Ohm). The possible mechanisms are discussed.

OPTIMIZATION OF ANTIMICROBIAL FILM SYNTHESIS
Tess Cannon, Raymond Lesiyon
Engineering Computer Science and Mathematics, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 220
Mentor(s): Evangelyn Alocilja

Every year, about 31% of food (equivalent to 133 billion pounds) is thrown away without being consumed in the United States, according to USDA [1]. This is due to many reasons from both consumer and retail. Even with proper cleaning measures taken, vegetables can become contaminated with bacteria over time. The percentage of wasted food has the potential to be reduced by prolonging the shelf life of fruits and vegetables with antimicrobial films (AMF). Antimicrobial films can inhibit the growth of foodborne pathogens such as *E. coli*and *Salmonella,* thus extending the shelf life. In previous research done in the Nano-Biosensors Lab, an antimicrobial film was successfully developed to prevent bacterial growth on vegetables such as lettuce, spinach, and cucumber. In this research study, antimicrobial films were made using the same methods as the previously developed films. However, the thickness of the film was varied to determine whether thinner films of the same composition were equally as effective at bacterial inhibition as thicker films. If this is the case, thinner films can be used to reduce the cost while still providing the same benefits as thicker films. With increasing population trends, the Food and Agriculture Organization of the United Nations predicts that food production must be increased by 70% to feed the population in 2050[2]. Limiting food waste could provide additional food security for the future. The use of antimicrobial films can reduce bacterial growth on stored vegetables preventing food waste, benefiting the economy.

DIFFERENCES IN FINGER FORCES BETWEEN OSTEOARTHRITIC AND HEALTHY INDIVIDUALS
Katharine Walters
Engineering Computer Science and Mathematics, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Ballroom
Presentation Number: 335
Mentor(s): Tamara Bush

An estimated 4.5 million people suffer from hand-wrist arthritis in the US, and many report significant limitation or inability to perform activities of daily living. The aim of this work is to understand the differences in finger forces between individuals with osteoarthritis compared to individuals with healthy hands. Kinematic hand data were collected using a Qualisys motion capture camera system and force data were collected simultaneously with an AMTI six-axis load cell. While gripping a handle, participants were asked to exert maximum force with the tip of their index finger onto a force apparatus attached to the load cell in two directions: pushing straight down towards the ground and pulling toward their wrist. The distance of the force apparatus from the handle was adjusted at seven points between 5mm and 100mm to change the participant's finger flexion. An analysis of the force magnitudes and directions is expected to show that participants with osteoarthritis exert generally smaller forces than participants with healthy hands. The results of this study are important because understanding how individuals with osteoarthritis exert finger forces can lead to advances in the design of everyday devices to reduce the limitations for those who suffer from the disease.

VISUAL TEST FOR RAPID DETECTION OF ANTIBIOTIC-RESISTANT BACTERIAL STRAINS
Emma Dester
Engineering Computer Science and Mathematics, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Ballroom
Presentation Number: 336
Mentor(s): Evangelyn Alocilja

Determining the correct antibiotic concentration necessary to prevent bacterial growth, known as the Minimum Inhibitory Concentration (MIC), is an essential step to effective disease treatment. Although many methods can be used to determine this concentration, the more cost-effective methods, such as broth microdilution trays, unfortunately require at least one overnight incubation. Costly automated instrument systems are also available, but detection time can still range from 3.5-18 hours, depending on the pathogen and the machine. As a result, correctly diagnosing antibiotic-resistant disease strains and providing patients with the correct antibiotic treatment in the same day is nearly impossible. This research will present an experimental comparison between a newly developed, nanoparticle-based assay for antibiotic resistance testing and the traditional broth microdilution MIC test, utilizing drug-resistant and drug-susceptible strains of *Staphylococcus aureus*. The nanoparticle-based method utilizes interactions between bacterial cells and magnetic nanoparticles (MNPs) to visually detect the concentration of live bacteria in a sample within 10-15 minutes. Preliminary testing has shown this MNP-based method can detect the effect of an antibiotic treatment on

bacterial concentration more rapidly than the overnight visual turbidity change required with traditional MIC tests. The accuracy, speed, and cost-effectiveness of the MNP-based method will be compared to the traditional MIC test. This technology has the potential to provide cheap and accurate same-day diagnosis for follow-up patient treatment of antibiotic-resistant bacterial strains.

D-CYPHER HUMAN SWARM INTERACTION: AN OPEN-SOURCE PLATFORM FOR MULTI-ROBOT AND HSI RESEARCH
Andrew Mcdonald
Engineering Computer Science and Mathematics, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Ballroom
Presentation Number: 337
Mentor(s): Vaibhav Srivastava

As autonomous robotic systems become increasingly prevalent in today's world, the importance of developing efficient, reliable control algorithms governing such systems is absolutely paramount. Furthermore, the vision of omnipresent robots interacting with humans requires inexpensive experimental platforms facilitating such studies. Unfortunately, these experimental platforms are ones with high barriers to entry, as hardware and software necessary to conduct such research is complex, costly, and largely closed-source. While platforms like Georgia Tech's Robotarium allow for multi-agent experimentation via remote access, no resources currently exist to enable human-swarm interaction (HSI). Alternative open source mobile robot platforms such as Harvard's Kilobots are highly limited in terms of their ability to communicate with each other, and require costly fabrication of surface mount PCBs. The objective of this project is to develop an open-source wheeled multi-robot platform with associated HSI interface that can be developed using only off-the-shelf parts, provided code and instructions. The target cost for a 10 robot system is $500; such low cost will enable high school students and other researchers to easily afford these platforms and become acquainted with multi-agent system and HSI research. My presentation will detail my efforts to develop this open-source, freely-accessible set of hardware schematics and software packages enabling timely, low-cost implementation of a configurable platform for multi-robot and HSI research, consisting of replicable robot designs along with robot tracking and navigation software.

AIRBAG SAFETY
Matt Wolf
Engineering Computer Science and Mathematics, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Ballroom
Presentation Number: 338
Mentor(s): Per Askeland, Carl Boehlert

Airbags are a safety feature in cars that many people take for granted. When working properly, airbags can save a car accident victims life. Although these devices are very useful, they can sometimes cause extra injury to a person. The purpose of my research is to see if there are any different materials that can be used, or ways to make airbags a little bit safer. In general, most airbags are made out of a nylon fabric; this can be rough when deployed at high speeds. The most common types of injuries caused by airbag deployment include burns and broken bones, but could even be as severe as having an imprint of the airbag left in the cornea of the eye. My research will include determining exactly what causes these injuries and what can be done to prevent them. I will use scanning through electron microscopy to determine exactly what components are inside the airbag, along with looking at the molecular geometry of the bag itself. This topic intrigued me because I have been in a car accident before, and fortunately was not injured, but I know people who have suffered injuries due to airbags.

A BLOCK CHAIN INSPIRED RADIO-FREQUENCY IDENTIFICATION (RFID) BASED INFORMATION ARCHITECTURE FOR A FOOD SUPPLY CHAIN
Kanishka Wijewardena
Engineering Computer Science and Mathematics, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Ballroom
Presentation Number: 339
Mentor(s): Prem Chahal

A Block Chain inspired Internet-of-Things architecture was designed for creating a transparent food supply chain. The architecture uses a proof-of-object based authentication protocol, which is analogous to a cryptocurrency's proof-of-work protocol. The completed architecture featured an integrated RFID based sensor as the physical input/output terminal of the Block Chain at each stage of the food supply chain. The RFID provides a unique identity of the product and the sensor data helps in real time quality monitoring. For this purpose, a small feature size 900 MHz RFID coupled sensor was fabricated and demonstrated for real time sensor data acquisition. I worked specifically on simulating the

Block Chain architecture, using the programming language Python, and programmed the Microcontroller used for the RFID sensor. The Block Chain architecture helps in creating a tamper-proof digital database of the food packages at each instance. A detailed security analysis was performed to investigate the vulnerability of the proposed architecture under different types of cyber-attacks.

RAMANSAUCE: OPEN SOURCE SOFTWARE FOR MULTIPLEXED IMAGING OF SURFACE-ENHANCED RAMAN SCATTERING NANOPARTICLES
Aakash Dave
Engineering Computer Science and Mathematics, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Ballroom
Presentation Number: 340
Mentor(s): Zhen Qiu

Prompt detection and accurate resection of gastric cancers is imperative for successful therapy. The current screening standard is white-light endoscopy, but it is insufficient in many respects. For example, small pre-neoplastic lesions are often overlooked, and inaccurate margin detection may yield incomplete resection. Newer techniques provide improved scanning speeds and spatial sensitivity by inserting fiber-optic-based Raman imaging devices into the endoscope accessory channel. These devices detect surface enhanced Raman scattering (SERS) nanoparticles, which travel through fenestrations in the tumor neovasculature and aggregate. As this technique approaches clinical translation, corresponding software that is not onerous to use is needed. Thus, we have developed novel open-source software to analyze SERS nanoparticle signals through a graphical user interface (GUI). RamanSauce integrates Raman signal noise-reduction techniques to reconstruct the acquired image with minimal loss in two or three-dimensions. Additional interactive features include ratiometric imaging, image segmentation with mass intensity, and topographic modeling of hollow organs. Here we describe the software design, demonstrate its implementation, and highlight ways the software may be adjusted for individual needs.

ENVIRONMENTAL SCIENCE & NATURAL RESOURCES

RESILIENT URBAN AGRICULTURE: POLICYMAKER PERSPECTIVES IN THE GREATER LANSING AREA
John Witherspoon
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 76
Mentor(s): Allison Goralnik, Stephanie White

Urban agriculture is a growing system in the Lansing area, providing many economic, social, environmental, and health benefits. Urban farms and community gardens create green spaces where communities gather, help mitigate climate change, and provide fresh foods for food insecure residents. Over the last year, we have been interviewing and surveying urban agriculture participants about their motivations for participation and experience with local governance to understand if and how formal and informal rules and policies either inhibit or promote a resilient urban agriculture system. But we have not yet interacted with policymakers. This project will interview several key policymakers across local government to explore the intersection between how urban agriculture participants and local policymakers value the contributions of urban agriculture, and how both groups envision a resilient system in the future. After co-conducting the interviews in February and March, I will transcribe the data and conduct a qualitative content analysis to identify themes. The results will inform a resilience workshop we will host in fall 2019 with diverse urban agriculture stakeholders. Knowing what policymakers think about urban agriculture can illuminate opportunities for them to interact with and support key stakeholders and system change. By bringing them in, a dialogue between growers and policymakers is opened, which causes the system to be stronger and more resilient.

COMPARING WHITE-TAILED DEER MOVEMENT RATES AND ACTIVITY ACROSS AN URBAN-TO-RURAL GRADIENT
Garrett Knowlton
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 77
Mentor(s): Jonathan Trudeau, David Williams

Chronic wasting disease (CWD), a fatal disease spread through contact between susceptible animals and contaminated environments, was found in the free-ranging white-tailed deer (Odocoileus virginianus) population in Michigan's Lower Peninsula in 2015. When CWD prevalence is high it can have major impacts at the population level and is very costly to manage. Deer moving long distances have the potential to quickly spread CWD to new populations. Though there has been much research on white-tailed deer movement separately in urban and rural environments, no studies have looked at how movement and activity patterns change across an urban-to-rural gradient. We used GPS data collected from collared deer to quantify how movement and activity patterns change with increasing development. Specifically, we calculated movement rates between consecutive locations and assessed peak times of activity. This information can be utilized by managers in areas with CWD management to better inform when peak activity and movement of deer may occur across a developmental gradient. More information about deer movement can allow managers to identify the most important areas to allocate management resources. Knowing peak activity times in areas with CWD can provide crucial information about the time of day an individual has the greatest likelihood of locating deer, allowing managers to trap or cull animals more efficiently.

REMOVAL OF PHOSPHORUS FROM MICHIGAN WINERY WASTEWATER
Brynn Chesney
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 78
Mentor(s): Steven Safferman, Katelyn Skornia

Local wineries are an important part of Michigan's economy. The wastewater that is produced during wine manufacturing is high in phosphorus. The wastewater treatment system that is being investigated does not have a method to continuously remove phosphorus. Phosphorus is one of the main nutrients that contributes to algae blooms in Michigan's Great Lakes. Excess algae is harmful to water ecosystems. Therefore, treatment of phosphorus in winery wastewater is required to maintain the health of Michigan's waters. PO4Sponge is a well-established media that is used to remove phosphorus from wastewater. Once the sponge has reached close to its max capacity for absorption, the phosphorus can be removed and the sponge can be reused. In this experiment, winery wastewater will be run through closed columns of PO4Sponge. Closed columns ensure that all of the wastewater has direct contact with the desired medium. The Empty Bed Contact Time (EBCT), or the amount of time that the wastewater is in contact with the media, is to be set at 30 minutes. The EBCT is dependent on the volume of media in the column, and the flow rate of wastewater through the system. The flow rates of top-down systems are more difficult to control than bottom-up systems, as top-down systems are dependent on gravity. However, bottom-up systems require more energy to pump the wastewater. This experiment will determine the efficacy of top-down phosphorus treatment of winery wastewater in a closed column of PO4Sponge.

SWIMMING IN CIRCLES: ESTIMATING THE SUBLETHAL EFFECTS OF NEUROTOXICANT CHEMICALS ON LARVAL FISH SWIMMING BEHAVIOR
Annica Brocker
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 79
Mentor(s): Cheryl Murphy, Janice Albers

Concentrations of neurotoxicants, such as methylmercury and PCB126 that exert sublethal effects are still prevalent in the environment. When yellow perch (Perca flavescens) larvae are exposed to these neurotoxicants during development, the fish can experience behavioral setbacks that, in addition to other stressors such as predation and fishing, can culminate in low survival. Here, we outline a method to calculate different movement metrics that describe swimming behavior and quantify the swimming effects of sublethal doses of pollutants on freshwater fish larvae. Ctrax?, a commonly used software for animal movement studies, calculates parameters such as orientation, position, speed, and turning angle of the animal's movement. However, Ctrax uses the orientation of the subject in the calculation of the turning angle, but the orientation is often recorded incorrectly. Consequently, we calculated the turning angle by assuming the orientation of the larvae is in the same direction as the trajectory of the fish. We do this by using three consecutive locations of an individual yellow perch larva, which eliminates the need for manual correction. In addition to the turning angle, we also calculated the consistency of the turning angles along the swimming path and the distance traveled. These three parameters are used to model larval yellow perch movement and survival and will be incorporated into population models to predict the population level effects of the sublethal concentrations of the neurotoxicants.

A NEW WALL FILM MODEL FOR MEMBRANE FOULING BY EMULSIFIED OIL
Vincent Marinelli
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 80
Mentor(s): Volodymyr Tarabara, Andre Benard, Sina Jahangirimamouri, Charifa Hejase Bazzi

Oil-in-water emulsions represent a major waste stream of oil and gas, food-processing, metal-working, mining, and other industries. If not properly treated, these wastewater streams can pose significant environmental risks. Membrane filtration is the most cost-effective technology capable of removing oil droplets smaller than 10 µm, often a prerequisite for meeting environmental regulations. However, membrane fouling by oil limits the broader acceptance of this technology. In the present study, we investigate the impact of practical operating conditions (crossflow velocity and transmembrane pressure) on membrane fouling by emulsified oil. A new wall film model for oil droplet deposition and attachment to a microfiltration membrane is proposed using computational fluid dynamics simulations. The model predicts subsequent membrane fouling and estimates the water permeate flux. Constant pressure crossflow filtration tests were carried out to validate the proposed model. The Direct Observation Through the Membrane technique was employed to gain detailed mechanistic insights into oil droplet behavior at the membrane surface.

BIODEGRADABILITY TESTING OF BIO-BASED POLYMERS IN AQUEOUS ENVIRONMENT
Madeline Robison
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 142
Mentor(s): Ramani Narayan, Apoorva Kulkarni, Sayli Bote

Humans rely on various polymers in their everyday lives and it is no secret that the disposal of these plastics is interfering with the earth's biosystems due to the amount of time they take to biodegrade. One solution to this problem is to create a polymer that biodegrades as quickly as possible. To do this, it is necessary to fully understand the biodegradation process and how we can quantify the biodegradation process for a given polymer. The objective of this research is to explain the biodegradation process and to elaborate on the method of measuring the extent of biodegradation of various polymers in an aqueous environment. In the current study, we are testing for the biodegradation of two polymeric samples and using cellulose as a reference material. The amount of carbon dioxide evolved each day is being measured and it is used to calculate percent biodegradation of material. The material is biodegradable if it shows a percentage biodegradation of 90% or more along with the reference material. Analyzing the biodegradation of the polymers will help pave the way towards a more sustainable future.

GEOCHEMICAL ANALYSIS OF DYKE SWARMS TO CONSTRAIN MAGMATIC PLUMBING SYSTEMS AND ASSIST IN STRATEGIC METAL EXPLORATION IN MARQUETTE MICHIGAN
Erik Eikey
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 143
Mentor(s): Tyrone Rooney

The Mid Continent Rift (MCR), a 1.1 Ga failed rift located in the Great Lakes Region, hosts some of the largest and most valuable accumulations of strategic metals in the world. Many of those mineral deposits are hosted within the magmatic conduits for the rift filling lavas. Mining operations in the region such as Eagle mine and Tamarack have been taping into these ultra-mafic conduits and the presence of dike swarms in the regions around these operations has been noted. Recently there has been a growing recognition that dike swarms provide valuable windows to examine the magmatic plumbing systems of the regions in which they were emplaced. With an increased understanding of magmatic plumbing systems and the relation of the dike swarms to these ultra-mafic conduits, more deposits of these valuable strategic metals can be located. This study will conduct a chemical and petrological analysis of dikes from areas around Marquette, Michigan that are associated with the Keweenawan large igneous province. Major and trace element data gathered through the use of LA-ICP-MS was used to create a dataset. This new geochemical and petrologic dataset will be compared with datasets from extensively constrained dikes swarms and flow regimes around the MCR. The comparison to well constrained magmatic plumbing systems allows for inferences to be made about the swarms located in Marquette. With an increased understanding of the magmatic plumbing system around the Marquette region, potential leads to new discoveries of economically valuable ore deposits will be possible.

EFFECTS OF SUBLETHAL SEA LAMPREY (PETROMYZON MARINUS) PARASITISM ON LONG-TERM MILT CONCENTRATION AND TESTOSTERONE PRODUCTION IN TWO LAKE TROUT (SALVELINUS NAMAYCUSH) MORPHOTYPES.
Michaela Kratofil
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 145
Mentor(s): Cheryl Murphy

Previous studies on interactions between Sea Lamprey and Lake Trout have focused on direct mortality of Lake Trout populations resulting from Sea Lamprey parasitism. However, an estimated 45-75% of Lake Trout survive a parasitism event. Little is known about how the reproductive physiology of survivors is affected or what the consequences are for Lake Trout populations. Previous studies have indicated Sea Lamprey parasitism affects Lake Trout reproduction in the short term by suppressing plasma sex-steroid concentrations as well as other reproductive endpoints. This study focuses on sublethal effects of Sea Lamprey parasitism on long-term testosterone production and milt concentrations in male lean and siscowet Lake Trout. Plasma and milt samples were collected from both morphotypes of parasitized and non-parasitized Lake Trout one year following sea lamprey parasitism. Milt and testosterone concentrations were compared from parasitized and unparasitized individuals. Parasitized siscowet Lake Trout had significantly lower milt concentrations one year after parasitism than their unparasitized counterparts. Lean lake trout displayed the same trend, but differences were more subtle. Conversely, for both morphotypes, parasitized individuals had higher plasma testosterone concentrations than unparasitized individuals, albeit not significantly. These results provide insight into the mechanism driving reproductive disruption in parasitized Lake Trout and will be useful for predicting effects at the population level.

THE EFFECTS OF FOREST RETENTION TREATMENTS ON MICROCLIMATE AND CARABID BEETLE SPECIES COMPOSITION
Tara Mojzuk
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 146
Mentor(s): Sean Sultaire

Structural retention is widely used to promote sustainable practices and maintain biological diversity within managed forests. We assessed the effect of green tree retention patch size and location on microclimate (i.e. temperature and humidity) in timber production forests west of the cascades in Oregon and Washington during the summer of 2018 under the premise that differences in retention patch size, shape, and connectivity to adjacent forest will result in different microclimates and thus different carabid species compositions throughout. We used 5 different retention treatments, replicated 4 times, to quantify temperature and humidity differences between each treatment and its corresponding cut. Due to exposure to the surrounding cut, we predicted small patches to be most susceptible to changes in microclimate. As such, the difference in microclimate between small patches and the cut will likely be less pronounced than larger patches. Results show, smaller patches maximum temperatures averaged a 3-degree difference from the cut, while larger patches averaged a 14.4-degree difference. Larger patches were about 3 degrees warmer than cuts when comparing minimum temperature values, while smaller patches were ~1 degree warmer. Maximum RH did not show a significant difference between patch and cut, though minimum RH averaged 27% higher in the patch than the cut for larger patches and 7.8% higher for smaller patches. We predict microclimate variations between treatments will affect species composition of carabid beetles in that species sensitive to higher temperatures and lower humidity will be found in large patches and not in cuts or small patches.

CARBON DYNAMICS DURING STORM EVENTS IN ARCTIC WATERSHEDS WITH VARYING LANDSCAPES
Sam Cairns
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 147
Mentor(s): Arial Shogren, Jay Zarnetske

Vast stores of organic carbon (C) are locked away in frozen Arctic permafrost. However, the Arctic is warming at twice the rate of the rest of the globe, leading to the release of terrestrially-stored C into the natural environment and transported in rivers. Ultimately, these C stores will contribute to atmospheric CO2concentrations and exacerbate climate change impacts felt far from these remote regions. Therefore, it is critical to constrain the timing and magnitude of C exports from these sensitive Arctic landscapes. Storm events are critical times of C transport, though has not been previously explored for Arctic watersheds with varying landscapes. To fill this knowledge gap, we observed the shape, direction, and magnitude of concentration-discharge (C-Q) relationships from high-flow events using high-frequency discharge and dissolved organic carbon (DOC) data from three distinct watersheds. Our study watersheds were associated with the Long-Term Ecological Research (LTER) Toolik Field Station and include the Kuparuk (low-gradient tundra), Oksrukyuik (lake-dominated tundra), and Trevor Creek (high-gradient alpine). Across all watersheds, we found consistent evidence for DOC flushing during storm events, where DOC is readily released from the landscape into the river during high flow events. For some events, we found evidence for DOC hysteresis, or non-linear loops of concentration over discharge. The hysteresis loop direction is indicative of either proximate or distant DOC sourcing, and this behavior was watershed-dependent. Our study provides critical insight into Arctic C dynamics, revealing that high-flow events promote C transport through permafrost-underlain landscapes.

HAIR SHAFT DAMAGE SECONDARY TO COSMETIC TREATMENTS OF HAIR: SCANNING ELECTRON MICROSCOPY STUDY
Rijul Maini
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 227
Mentor(s): Carl Boehlert, Per Askeland

Bleaching and hair straightening are some of the most common cosmetic hair treatments used around the world. However, it has been argued that these sorts of hair modification techniques can lead to damage of the hair shaft. The aim of this study was to utilize scanning electron microscopy to observe any significant changes in the hair shaft subsequent to bleaching and/or straightening. A case study was run on two volunteers: one regularly utilizes these

treatments, and the other does not use any specific hair treatment procedure. The latter was used as a control to compare any significant changes in hair shaft texture between treated and not treated hair. Hair strands were assigned a number on a scale of 0 to 5 based on damage, 0 being no damage and 5 being very damaged. A chi-squared test of independence was run to obtain a p-value. A statistically significant p-value would indicate that the difference in hair between the control and the experimental specimen was not due to chance.

HOW DOES PRESCRIBED FIRE INFLUENCE SOIL CARBON STORAGE IN CRITICALLY IMPERILED PINE BARRENS?
Emma Ashley-Grose
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 228
Mentor(s): Jessica Miesel, Kathleen Quigley

Soils are an important carbon (C) sink and store nearly 80% of terrestrial C. However, land management and disturbance may significantly alter soil carbon inputs and losses. For instance, wildland fires result in: 1) release of atmospheric CO2 during organic matter combustion, and 2) thermal transformation of organic C to charcoal, or "pyrogenic carbon" (PyC), which is considered a temporally-stable C sink. My goal is to identify how prescribed fire influences soil C storage in a diverse mosaic landscape of grassland, shrubland, conifer woodland, and deciduous forest. I will use soil digestions to quantify C and PyC concentrations in soils collected before and after large-scale (~1000 acres/unit) prescribed burns in the Moquah Barrens (Wisconsin, USA). Next, I will scale C concentrations to the landscape in order to create maps for visual comparison of soil C pools in relation to vegetation cover, fuel loads, and burn conditions. Finally, I will use statistical tests to describe how variation in vegetation cover, fuels, and burn conditions influence soil C stocks. My findings will inform land managers about how prescribed fire management affects soil C dynamics. Furthermore, because soils have the potential to sequester C and offset anthropogenic CO2 emissions, our findings will provide valuable information about stable C storage in PyC.

RESEARCH INTO UNDERSTANDING THE USE AND BENEFITS OF FOREST THERAPY
Lee Spangler
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 229
Mentor(s): Emily Huff

For many people, spending time in nature has a calming effect. There are many hypotheses for this effect, but precise benefits are poorly understood, and pairing health outcomes with nature is challenging due to difficulty in assigning economic value to these ecosystem services. It is often difficult to find time for self-care activities, but often those who do choose activities related to stress or anxiety reduction, and often outdoors. Research aimed at understanding the benefits of using nature as or in conjunction with various modalities of therapy have focused on many disorders, both chronic and acute. A general survey and specific pre-/post-surveys to measure likelihood of engaging in forest therapy, and effects of a pilot forest therapy program were used. Outdoor activities to assess the benefit of certain "mindfulness activities" in the Fall 2017/Spring 2018 were conducted. A group of 58 students were given pre-activity surveys to assess mental states, and perceptions of Forest Therapy before being lead through an MSU natural area and exposed to exercises which could be used as therapeutic activities. Afterwards, students completed post-surveys to assess mental state, and give feedback regarding activity impact on any sense of well-being. Results indicate that mental states after exposure to the time outdoors/therapies did have an overall positive impact. An online survey was then administered to 90 people to investigate outdoor activities performed, frequency, environments preferred, benefits attributed to activities, and interest/willingness to take part in activities meant to have a more therapeutic context. The results of which were also positive overall.

LINKING SPATIAL AND GEOCHEMICAL DATA USING QGIS AT A THIN-SECTION SCALE
Erika Miciuda
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 230
Mentor(s): Tyrone Rooney

A new frontier in the investigation of earth materials is constraining the spatial variability of compositional data on a microscopic scale. While such data has been available since the advent of the first microprobe instruments, the rise in laser ablation inductively-coupled plasma mass spectrometry (LA-ICP-MS) has resulted in the production of more

diverse and much larger volumes of data. Within this new paradigm, developing an understanding of spatial relationships within such datasets requires a systematic approach to data management and visualization. *QGIS*is an adaptive program serving to organize data within a global or user-defined spatial x-y coordinate system. While GIS is typically used for geographic mapping of large-scale regions, it may also be adapted to the mapping of traditional microscope slides. As a proof of concept, we couple a spatially constrained LA-ICPMS dataset with microscope imagery of thin-sections. The reference coordinate system obtained for points from the LA-ICPMS dataset are "georeferenced" and combined with a scanned thin section image using *QGIS* correlation tools. This unified layer-based dataset can be enhanced by identifying discrete objects within the thin sections (e.g., different crystal types), where data heterogeneity may be anticipated. This project will serve as a foundation for future work within our research group by creating a common set of procedures for the collection, storage, and visualization of these data. The goals of this project extend beyond maintaining data-integrity, and seek to drive future innovation in the interpretation of geochemical spatial trends on the microscopic scale.

EVALUATING SAMPLING GEAR TYPE'S ABILITY TO PREDICT THE IMPACT OF ASIAN CARP SPECIES WITHIN THE GREAT LAKES
Jamie Raupp
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 231
Mentor(s): Kelly Robinson

As human populations continue to grow, the Great Lakes watershed faces an increased risk of disruption due to altered drainage patterns, use of canals, and distribution of non-native species. In order to protect regions particularly susceptible to the introduction of invasive species, many natural resource agencies have sought to implement preventative management strategies. The introduction of Asian carp species poses a severe ecological threat to the watershed due to their large size and tendency to negatively alter native ecosystems. Effective detection and control efforts require a better understanding of the habitat use, gear efficiency, and catchability for these species. Without the active reduction of uncertainty within these models, inaccurately generated estimates may result in the ineffective management of a region. The objective of our research is to examine the efficiency of sampling gear types, as this has been previously identified as one of the main uncertainties in current carp management practices. Evaluation of sampling gear included sampling 5-6 transects in three areas of the Michigan waters of Lake Erie with electrofishing and trammel nets. Within these transects, site observations and the biological characteristics of existing carp populations such as Common Carp (Cyprinus carpio) and Buffalo Carp (Ictiobus) were documented by researchers. Our findings shall indicate specific gear type's capacity for accurately modeling populations, which can help provide further insight into the Great Lakes region in order to aid the overall effectiveness of proactive natural resource management.

NEST PREDATION RISK ASSESSMENT OF A GLYPTEMYS MUHLENBERGII TRANSLOCATION PROGRAM
Sarah Klein
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 232
Mentor(s): Cassie Dresser-Briggs

Since 1988, Zoo Knoxville implemented an experimental release program for bog turtles in Northeast Tennessee, at a site which was previously uninhabited by bog turtles. The release population consists of turtles captively bred as well as head-started offspring from wild caught gravid females. Although the translocated turtles have a high annual survival rate, researchers have not found any new (i.e. non-released) turtles since the first release in 1991. One potential factor contributing to the lack of recruitment could be nest predation. This study aims to determine if there is a significant amount of nests predated, and if so which species are the predominate predators. To test our hypothesis, we located nests and mounted wildlife cameras that capture images of disturbances in the nests. In order to maximize the number of nest, we attached radio-transmitters to gravid females and tracked them until they nested. Three of the five nests found were protected with excluders designed to prevent predation by meso-predators, such as racoons and skunks. None of the nests showed signs of nest predation, unlike similar studies which showed a 51 percent predation rate in unprotected nests and 6 percent predations rate in protected nests (Knoerr, M. D., 2018). Alternative explanations for the lack of recruitment could be the higher elevation of translocation site in comparison to native sites may have cause prolonged period of nesting and incubation. Continued research should be conducted at the site to survey population, including nest observations to increase sample size and assess temporal variation.

THE EFFECT OF FIRE MANAGEMENT ON THE KAIBAB PLATEAU VEGETATION COMMUNITY
Jessica Diaz
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 319
Mentor(s): Clare Aslan

The Kaibab Plateau, located in northern Arizona, has an ecological community that encompasses low-elevation grasslands up to mixed conifer forests. The historic fire regime of these communities was fire ignition by lightning which occurred at regular intervals creating low-intensity fires. After the settlement of the area in the 1800's, fear of fire destroying homes and livelihoods began a trend of fire suppression. This caused an accumulation of pine needles, shrubs, grasses, and dead and live trees which shifted the fire regime to low frequency, high-intensity fires. This study looks at how fire presence on the Kaibab Plateau after a history of suppression affects the ecological community and how the results of the study fit with current management goals. The study area is within the Kaibab National Forest managed by the US Forest Service with one of the main goals being to restore the historic fire regime. The species considered in this study are ponderosa pine and aspen along with the understory vegetation and ground cover.

EXPLORATION OF ALTERNATIVES FOR HUMAN BURIAL
Emily Mabry, Lea Dyga
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 320
Mentor(s): Georgia Peterson

The goal of the project is to discover the most environmentally sustainable form of burial while maintaining a reasonable budget and being sensitive to religious traditions. Tradition Burial techniques have negative effects on ecosystems, are extremely costly, and take up valuable land in communities. Through research, we hope to gain a comprehensive understanding of traditional burial methods and their effects on the environment and their consumers in order to discover effective alternatives that will be generally accepted by the public. This will be achieved through preliminary research and source synthesizing, surveys conducted that are randomly sampled and stratified to include different demographics of subjects, and an experiment of the effects of burial on the environment. The long term effects of this data could provide quantified data on economic/ecological impacts of alternative and traditional burials and present long-term effectiveness of alternative burials on the environment and economy.

PRAIRIE RESTORATION METHOD AFFECTS INVASIVE FLOWERING SPECIES AND POLLINATORS
Ally Brown
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 321
Mentor(s): Lindsey Kemmerling, Nicholas Haddad

Invasive species are an increasingly important threat to natural ecosystems and have the potential to impact the success of native species through competition for resources. The negative effects of invasive species can be particularly acute in restored areas, as ecosystem restoration and invasive species removal are costly, time-consuming processes. Prairies are a primary restoration concern as they have been reduced to less than 1% of historic range in North America due to human development and fire suppression. Prairies provide habitat to numerous species and are potential sources of biofuel, so increasing the quality of prairie restoration is valuable to the environment and people. This research examines the interactions between invasive plant species and native species (plant and pollinator) in low and high diversity prairie restorations. This study was conducted at 12 restored prairie sites within the Conservation Land Experiment at Kellogg Biological Station. In 2016, half of each site was planted with 12 native flowering species and the other half with 72 native species. Within each site we measured flower richness and abundance as well as pollinators and their associated flower. We found higher invasive species diversity in low diversity plantings than high diversity plantings. We also found that invasive species were visited more by nonnative honeybees, while native plants were visited more by native bees. These results indicate potential benefits of high diversity prairie restorations to native plant and pollinator communities.

NEVADA BLACK BEAR MOLECULAR GENETIC APPROACH TO POPULATION ESTIMATE
Ashley Kimmel
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 322
Mentor(s): Robert Montgomery

Nearly extirpated by the settling of the American west, black bears (*Ursus americanus*) are a recovering large carnivore species in the state of Nevada. Consequently, precise population estimates are needed to best guide management and conservation practices. During the summer of 2018, we non-invasively sampled black bear genetic material via hair snaring throughout the current black bear range in Western Nevada. Via a distribution of 100 hair snare sites spread across the range at a resolution of one per 49 km^2we collected black bear hair over a three-month period. In total, we acquired 207 hair samples. Existing methods of population estimation were refined for the purpose of this project. We utilized microscopy, silica-based DNA extraction, polymerase chain reaction (PCR), and gel electrophoresis protocols in order to visual short tandem repeats in the bear genomes called microsatellites. We looked for eight microsatellite sequences at loci A2, A107, B1, B125, D103, D112, D116, and D118 because they are highly variable and can be used to differentiate between unique individual organisms, even within a species. These molecular methods can be used to distinguish between generations of bears and even siblings. With these genetic techniques, we will be able to develop a population estimate for black bears via spatial capture-recapture modeling approached. In the future, we also plan to continue validating the new, optimized method for individual identification by testing hair samples collected in the summer of 2019.

THE LAST BASTION OF COLONIALISM: NATIONAL PARK ESTABLISHMENT IN FORMER BRITISH EAST AFRICA
Charlie Booher
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 323
Mentor(s): Robert Montgomery, John Waller

In 1872, Yellowstone was established as the first national park in the world. Since that time, scores of national parks have become fixtures of conservation on six continents worldwide. The creation of national parks in Africa, however is conspicuous in that the timing tended to directly precede the independence of post-colonial nations. This temporal dimensionality raises important questions regarding the motivations of colonial administrators. Colonialism is known to be one of the main conduits for the transfer of a number of cultural, political, and economic ideas around the world, and recent historical work suggests that it plays a similar role in conservation. In this analysis we considered the influence of the British Empire in Kenya, Uganda, and Tanzania. Preliminary research found that between the Second World War and the independence period (mid-20^{th}century) colonial administrators worked to establish national parks en masse. We expected that the motivations behind these decisions were rooted in control of environmental and wildlife resources. We also suspected that we would find these motivations to be explicitly prioritized over the rights, culture, and lifestyles of the people living in these localities. Via a rigorous review of primary and secondary literature, notably the journals of non-governmental organizations like the London-based Society for the Preservation of the Fauna of the Empire, we investigated these hypotheses. Here, we have delineated the history of this practice, including the Western roots of these colonial practices, the transfer of these ideals to East Africa, and the impact of these foreign systems on the people and wildlife that presently occupy these landscapes. Our work is aimed to inform practitioners and researchers on the many social, political, and economic factors that have worked in concert over time and space to create this situation.

OPTIMIZING WATER USE IN MI FOOD PROCESSING FACILITIES
Anna Raschke
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Ballroom
Presentation Number: 324
Mentor(s): Steven Safferman

Safe food processing is vital in our society but demands great amounts of resources, such as fresh water and energy. These valuable resources are required by all facilities and historically have not been highly managed. With the changing climate and increasing world population, these resources are increasing in value. Water and energy are interconnected - it takes energy to clean and distribute water and water to produce energy. Many food production facilities practice inefficient water usage throughout their manufacturing processes, which leads to unnecessary costs and burdens on the

ecosystem. Through detailed audits of production facilities, areas with potential for improvement in terms of water and energy efficiency are identified. In addition to individual suggestions for specific food processors, an MSU Extension guidance manual is being produced for all craft beverage processors to help with water conservation.

INFLUENCE OF TOPOGRAPHY IN TERRESTRIAL HOME RANGE ESTIMATIONS OF LARGE CARNIVORES
David Heit
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 8:30 AM, Room 30
Presentation Number: 711
Mentor(s): Robert Montgomery

Estimating the home range size of animals is critical to understanding their spatial dynamics and developing effective management strategies. This is of even greater importance to large carnivores in fragmented habitats. Despite this importance, most studies that calculate home range do so only in two-dimensions, as if animals only inhabit landscapes that are completely flat. Here we investigate how topography and three-dimensional landscape features affect the estimation of home range sizes in an area characterized by highly variable terrain. We implemented GPS telemetry on an isolated population of Persian leopards (*Panthera pardus saxicolor*, n=6) and globally-available digital elevation models (DEMs) to calculate the surface area of home ranges and compared it to traditional planimetric estimates. Our results determined that the incorporation of the third dimension into home range modeling can increase the range size measured by up to 37%. This is evidence to suggest that the common practice of estimating home ranges planimetrically may be severely underestimating home range size, introducing structural bias into further spatial analysis. We discuss how this lack of topographical reference could have impacts throughout the study of wildlife ecology, especially population density and animal movement models. We conclude that topography should be considered, not as an ancillary metric, but as an extremely important variable in home range estimation.

USING EDNA METABARCODING TO CHARACTERIZE AQUATIC FISH COMMUNITIES AND DETECT INVASIVE SPECIES IN MICHIGAN'S INLAND LAKES
Amanda Heathman
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 8:45 AM, Room 30
Presentation Number: 712
Mentor(s): John Robinson

The use of environmental DNA (eDNA) methods has many applications in the conservation and management of species, communities, and their habitats. In particular, eDNA metabarcoding, in combination with Next Generation sequencing, allows for the efficient characterization of aquatic communities and the detection of aquatic invasive species (AIS). This technique is investigated here as a tool for early AIS detection and diversity estimation on a community scale for Michigan lakes. Multiple water samples, both surface and benthic, from chosen lakes were collected and filtered on site. eDNA amplifications targeted at the 12S and 16S ribosomal DNA regions, using fish specific primers, and amplified samples were processed using next-generation sequencing approaches. Sequence data were used to estimate species richness and detect AIS in each lake. These data were then combined with the environmental variables from the Lake multi-scaled geospatial and temporal(LAGOS) database to evaluate the influences of abiotic variables (including connectivity between lakes, lake area, depth, temperature, water chemistry, land use, and land cover) on fish community diversity and AIS presence. Our results illustrate the utility of eDNA metabarcoding for the analysis of aquatic communities and detection of AIS. This information is useful in risk assessment and provides insight into the management and control of AIS.

ONE FISH, TWO FISH, RED FISH, BLUE FISH: HOW MUCH SAMPLING EFFORT AND HOW MANY GEARS ARE NEEDED TO CHARACTERIZE A FISH COMMUNITY?
Maggie Brown, Sophie Morin
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 9:00 AM, Room 30
Presentation Number: 713
Mentor(s): Mary Bremigan, Katelyn King

Assessing biodiversity is critical in understanding how ecosystems respond to environmental change. Accurate comparisons of biodiversity across ecosystems require that species composition be assessed in a reliable, standardized fashion. However, standardizing sampling methods to characterize fish assemblages in Michigan's thousands of inland lakes is a challenging task. Because different gear types target different subsets of fish species and habitats, multiple

gear types are often used to ensure representative samples; however, surveys of different lakes do not always employ the same set of gears. Understanding each gear's ability to detect certain species will indicate which gears are most valuable for assessing biodiversity. Therefore, we aim to identify the particular set of sampling gears that most reliably characterizes fish species richness and composition of Michigan lakes. We are analyzing fish assemblage data from the Michigan Fisheries Division (MDNR) Status and Trends Survey Program of inland lakes to determine which of five gear types is/are the most necessary for characterizing the biodiversity of these lakes. For each lake-gear combination, we are generating rarefaction curves to determine if enough fish were sampled to capture all species vulnerable to that gear. Additionally, we are determining what gear combinations are necessary to fully characterize the fish assemblage of each lake. Thus, determining the most effective gear combinations and the minimum effort required for each to accurately estimate species richness will help fisheries managers utilize their time and resources most efficiently and will provide a strong foundation for assessing how Michigan's lakes respond to environmental change.

ANTIMICROBIAL ANALYSIS OF A LINEAR LOW-DENSITY POLYETHYLENE (LLDPE) COMPOSITE CONTAINING ORANGE PEEL WASTE
Sydney Mckay
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 9:15 AM, Room 30
Presentation Number: 714
Mentor(s): Eva Almenar Rosaleny

Orange peels are naturally occurring food byproducts from citrus juicing that are commonly wasted. Previous research found that orange peel extract possesses antimicrobial properties, but my research explores the antimicrobial properties of the actual orange peel and its suitability to produce antimicrobial packaging. Utilizing orange peels as an antimicrobial agent embedded in a packaging material would extend the shelf life of the packaged food and increase food safety, while additionally providing a sustainable packaging advantage. In order to develop this desired antimicrobial packaging material, two tests were completed. The initial testing involved determining the minimum inhibitory concentration (MIC) of orange peel powder (OPP) in relation to a microorganism commonly found in diseased food (*Botrytis cinerea*). Once the MIC of the OPP was found, a specific amount of OPP was incorporated with linear low-density polyethylene (LLDPE) to develop an antimicrobial composite. The composite was then shaped into a film. The LLDPE/OPP film was found to reduce the growth of *Botrytis cinerea*. Due to the antimicrobial effectiveness of the developed LLDPE/OPP composite, orange peel byproduct can be used to produce active packaging for food applications.

DEVELOPMENT OF A 3D EARTH DATA SCIENCE VISUALIZATION TOOL
Luke Gerber
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 9:30 AM, Room 30
Presentation Number: 715
Mentor(s): Raechel White

This past fall semester I worked as a Geospatial Developer creating a 3D earth modeling tool. This work mainly focused upon creating a virtual reality application (in C#) for the visualization and analysis of remotely sensed data within a software called Unity 3D. Using the HTC VIVE, I was able to interact in this geospatial environment. This environment allows you to manipulate GIS data such as LiDAR (also dem) and view it from a 3D, point cloud perspective through a VR lens. Which leads to my main focus of the semester which was to figure out how to compile all of the tools I had gathered and create a virtual representation of Wayne County in Detroit. This particular environment would have 4 different spatial data sets; Parcel data, Building footprints, an aerial photograph and also LiDAR data for this particular location. Once the data is compiled together, you are able to interact with it from a VR perspective. This opportunity granted me not only new technical skills but also the ability to solve various problems, present information and enhance my creative abilities. The development of this tool has also pushed forth my knowledge in GIS and opens up doors to new ways you can visualize spatial data.

EPIDEMIOLOGY & PUBLIC HEALTH

CHARACTERIZING ADOLESCENT SCHOOLYARD BEHAVIORS USING WEARABLE CAMERAS
Hope Lewis, Sara Lehman
Epidemiology and Public Health, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 61
Mentor(s): Kimberly Clevenger, Amber Pearson

Outdoor time (i.e., recess) is one of the only daily opportunities for adolescents to be physically active during the school day, but little research has examined what adolescents do during this free-choice time. We aimed to characterize how adolescents spend school outdoor time, with the overarching goal of informing activity-promoting interventions in this setting. Adolescents (n=60, 10-12 y of age, 63% female) from 11 schools in New Zealand wore a wearable camera (Autographer) on a lanyard around their neck for two school days (Thur, Fri), which captured an image every ~7 seconds. Each image from outdoor time was coded for location (e.g., basketball court, pathway, fixed equipment), activity type (e.g., sitting, walking, sports) and social contact (e.g., alone). Adolescents spent an average of 30 minutes outdoors (n=193 images), with the majority spent on the court (37%) or near the school building (32%). Most of this time (76%) was spent in a group and the predominant activities were standing and/or walking (50%) and sitting (17%). However, there may be sex differences, as females spent more of their time near the school building (37 vs. 23%) and sitting (23 vs. 8%), and spent less of their time on the court (33 vs. 44%) or engaged in sports (10 vs. 15%) compared to males. These findings could inform school-based interventions, such as not allowing students to sit near the building, which may increase activity levels, particularly in females, who often demonstrate lower levels of physical activity compared to males.

SERUM VITAMIN D LEVELS ARE ASSOCIATED WITH SOCIO-EMOTIONAL ADJUSTMENT IN EARLY SCHOOL-AGED UGANDAN CHILDREN WITHOUT PERINATAL HIV INFECTION
William Yakah
Epidemiology and Public Health, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 62
Mentor(s): Jenifer Fenton

Vitamin-D insufficiency (VDI) may be associated with poorer behavioral outcomes but its role in socio-emotional adjustment (SEA) of vulnerable early school-aged African children is unknown. This investigation examines VDI-related deficits in SEA among 254 children that were perinatally HIV-infected (PHIV), HIV-exposed uninfected (HEU), or HIV-unexposed uninfected (HUU). Four caregiver-reported age and sex-standardized measures of SEA-externalizing problems (ESPI), internalizing problems (IPSI), behavioral symptoms index (BSI) and adaptive skills index (ASI), were defined for dependent children 6-10 years old using 175 standardized questions in the behavior assessment system for children. Serum vitamin-D was measured and analyzed in quartiles for relationships with SEA using repeated measures linear regression models. VDI was highly prevalent (74%, n=188) and did not predict SEA change over 12 months in all children (All p-values >0.05). However, VDI-related change in BSI, IPSI and EPSI varied by HIV-status (VDI*HIV, all p-values <0.03). Specifically, there was no association between VDI and any SEA measures among PHIV. Among HUU, BSI (b= -0.32, 95%CI:-0.50,-0.13), IPSI (b= -0.28, 95%CI:-0.47,-0.09) and EPSI (b=-0.20, 95%CI:-0.37,-0.02) all declined modestly per quartile increment in VD. Among HEU, *inutero* ART exposure modified VDI relationship to BSI, IPSI and EPSI (*Inutero*ART*VDI all p<0.02) such that higher VD predicted a moderate decline in EPSI (b=-0.26, 95%CI:-0.51,-0.02) among HEU without *inutero* ART. These results suggest that VDI may be associated with worse SEA among HUU and HEU without *inutero* ART exposure. Interventions targeting increasing blood vitamin D levels may remediate SEA impairments in large segments of Ugandan children.

CANNABIS USE IN THE UNITED STATES: ESTIMATES FOR MALES AND FEMALES OF THE 21ST CENTURY
Hamza Kaakarli
Epidemiology and Public Health, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 63
Mentor(s): James Anthony, Omayma Alshaarawy, Karl Alcover

In the 20th century United States (US), the use of cannabis products (e.g., "marijuana") was a gendered behavior, with a substantial male preponderance among users, just as also was true for alcoholic beverages. In recent years, social acceptability of alcohol and other drug use by women has increased, and cannabis use has become less stigmatized. In a

challenge to a null hypothesis of no male-female differences, we sought epidemiological evidence on male-female incidence of cannabis use, expecting a male excess risk. Each year, 2002-2017, a nationally representative sample of US non-institutionalized civilian residents aged 12 and older (n~60,000) has been drawn for the National Surveys on Drug Use and Health (NSDUH). Computerized self-interviews assessed cannabis initiation. NSDUH data now can be accessed via a Restricted-use Data Analysis System (RDAS). Using RDAS, we produced annual incidence rates for cannabis use, separately for males and females, with Taylor series 95% confidence intervals (CI), and then produced meta-analysis summary estimates via Stata-15 software. Our estimate for annual cannabis incidence rates among males is 1.7% (CI = 1.60%, 1.77%). For females, the meta-analysis estimate is 1.5% (1.41%, 1.59%). This difference is statistically robust ($p<0.05$), but visual inspection of estimates from 2002-3 forward indicate a potential narrowing of the male-female gap. We acknowledge study limitations, but we now focus on what might be accounting for a narrowed but still statistically robust male-female difference (e.g., affiliation with cannabis-using peers or female re-appraisal of risks faced by using cannabis once or twice or more regularly).

SURVEYING SMALL MAMMALS FOR THE BLACKLEGGED TICK (*IXODES SCAPULARIS*) AND ASSOCIATED PATHOGENS IN THE CLEVELAND METROPARKS (CLEVELAND, OHIO) IN SUMMER 2018
Gloria Yarandi
Epidemiology and Public Health, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 64
Mentor(s): Jean Tsao

The number of Lyme disease cases reported by the Ohio Department of Health has been increasing over the last decade. The increase is due in part to the westward invasion of the Lyme disease vector, the blacklegged tick, or Ixodes scapularis from Pennsylvania. The Cleveland Metroparks is a network of suburban and urban parks comprising > 23,000 acres in northeastern Ohio. Although blacklegged ticks are established in Cuyahoga County, their presence in the Cleveland Metroparks was unknown in Spring 2018. As part of a larger study investigating small mammal activity in relation to predator cues, small mammals were surveyed for ticks and several tickborne pathogens. Small mammals were sampled from 60 trapping arrays (900 m2 each) in the Millstream Run Reservation May-August 2018, during which larval and nymphal blacklegged ticks are expected to be active. From each captured individual, researchers collected all attached ticks and obtained a 2 mm ear biopsy. Total genomic DNA was extracted from all ticks and biopsies and assayed by PCR for the etiologic agents of Lyme disease, Borrelia miyamotoi disease, and human anaplasmosis. The majority of the ticks found on white-footed mice (*Peromyscus leucopus*) (n=66) and meadow jumping mice (*Zapus hudsoniu*) (n=6) were American dog tick (*Dermacentor variabilis*) larvae (n=9) and nymphs (n=7). Three blacklegged larvae, however, were found on three white-footed mice. These data confirm the presence of blacklegged ticks in the Cleveland Metroparks; given the likely increasing public health risk, other preserves should be similarly surveyed. Results of pathogen assays are forthcoming.

SURVEILLANCE OF AVIAN PATHOGENIC ESCHERICHIA COLI IN POULTRY AND CHILDREN IN REMOTE ECUADOR
Nick Monge
Epidemiology and Public Health, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 65
Mentor(s): Lixin Zhang

Surveillance of Avian Pathogenic Escherichia coli in poultry and children in remote Ecuador Avian Pathogenic Escherichia coli (APEC), is the source of various types of extra-intestinal infections in birds, responsible for multimillion-dollar annual losses to the global poultry industry. Among low- and middle-income countries (LMICs), APEC disease is often endemic with the rapid increase in industrial breeds of poultry. In an environment where humans and chickens frequently interact, such as in rural Ecuador, the transmission risk of APEC disease to human populations is high. We studied the prevalence of several virulence genes as markers for detecting APEC. We processed isolates from broiler chickens (n = 158), backyard chickens (n = 232), and humans (n= 154) in the rural Ecuador by amplifying 5 genes strongly associated with APEC: iroN, ompT, hlyF, iss, and iutA. E. coli with four or more these genes accounted 39.24% broiler chickens, 32.32% backyard chickens, and 16.23% human isolates, indicating substantial amount of APEC circulation in our study region. The backyard chickens around the households could potentially serve as disease sentinels for detecting APEC in the environment. Using GPS, we generated geospatial data on the movement patterns of backyard chickens. The substantial range of movement potentially promoted a wider spread APEC. In conclusion, using molecular diagnostic tools can improve our understanding of animal pathogens in resource limited areas and ultimately better inform our public health knowledge. The geospatial data from chicken movement patterns gives a proxy and better understanding of zoonotic pathogens spreading in the environment.

LOW DOSE LUNG CANCER SCREENING IN A RURAL SETTING
Andrew Waack
Epidemiology and Public Health, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 66
Mentor(s): Bengt Arnetz, Sukhesh Sudan

Lung cancer is most common cause of cancer death in the United States. Heavy smoking is the major risk factor for developing lung cancer. Rural areas have a higher prevalence of heavy smoking compared to urban areas, corresponding to a subsequent higher rate of lung cancer. The National Lung Screening Trial (NLST) demonstrated a 20 percent decrease in mortality following annual screening of heavy smokers with low dose computed tomography (LDCT) of the chest. Therefore, lung cancer screening with LDCT of the chest may be of significant benefit to rural populations. Since the NLST was conducted in only 33 large medical centers, it is not known if the results can be replicated in a small rural community setting. The purpose of this study was to determine if lung cancer screening can be performed successfully in a rural community setting. To our knowledge this information has not been previously reported. A retrospective review of all patients that underwent lung cancer screening with LDCT of the chest at a small 88 bed rural community hospital was performed. Several parameters regarding accuracy, including the false positive rate, were calculated. The average radiation measurements were also obtained. The results of the study match, or even beat, the results of the NLST. For example, this study demonstrated a false positive rate of 6.9%, while the NLST demonstrated a false positive rate of 12.8%. This study demonstrates the NLST results can be replicated in a rural setting, where such a screening program would be especially pertinent.

IMPACTING CANCER PREVENTION THROUGH EDUCATION AND COMMUNITY OUTREACH
Gracie Goble
Epidemiology and Public Health, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 67
Mentor(s): Mary Smania

Complex, interrelated factors contribute to the disparities in cancer incidence and death among racial, ethnic, and underserved groups. These disparities include low socioeconomic status, limited resources, and lack of education, all of which impact the information and services available. Studies have found that low socioeconomic status (SES) appears to play a major role in influencing behavioral risk factors for cancer. Research shows that individuals from medically underserved populations are more likely to be diagnosed with late-stage cancers that might have been treated more effectively if diagnosed earlier. The ACS, in its 2012 guidelines, recommends that community organizations work collaboratively to influence change. The impact of education through community outreach on gaps of knowledge was the primary focus of this project. Specifically, education about dietary risks associated with breast cancer as classified by the American Cancer Society (ACS). The goal of this program was to bring knowledge of ACS nutrition guidelines and to provide education on how to implement those changes. A systematic search was performed to find evidence-based articles that supported the cancer prevention dietary recommendations made by the ACS. These topics were then used to create an educational module including a cooking demonstration and educational component. We then measured the effect of the education using a pre- and post-test design. Analysis of the pre/posttest results will be analyzed using a t-test along with a program evaluation. The presentation will discuss the impact of education provided to a faith-based community.

EXPLORING AGENCY AND ACCESS TO HEALTHCARE IN RURAL TANZANIA: REPRODUCTIVE AND MENTAL HEALTH IN NAITOLIA VILLAGE
Ashley Nance-Panek
Epidemiology and Public Health, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 148
Mentor(s): Jonathan Choti, Amanda Laryea

In this study, our team conducted research in the rural Maasai village of Naitolia, Tanzania in order to gain a better understanding of reproductive and mental health situations and outcomes. We explored various factors affecting reproductive health outcomes including the integral role of traditional birth attendants (TBAs) in the reproductive health of Naitolians, common issues experienced during pregnancy, the role of men in maternal and infant health, birth location (clinic or home), decision-making in maternal and infant health, and access to resources. According to the District Medical Officer (DMO), reproductive health is covered extensively in the district due to the work of NGOs in the

community. In order to encourage men to be more actively involved in maternal and infant health, incentives are given to parents. We found that clinic births are becoming increasingly common in Naitolia, and 47% of household interviewees believed there was a higher mortality rate associated with home births compared to health facilities. Due to the long distance, some women prefer home births since some women have experienced birth on the way to the clinic. We found that reproductive education is covered in primary school in Naitolia, and students would like to learn more about family planning. Girls want to learn more about menstrual cycles and other female biological processes. In terms of mental health, mainly only rare and extreme cases of psychosis were mentioned, and further study should be conducted regarding mental health in Naitolia village and Tanzania as a whole.

PSYCHOSTIMULANT USE IN THE UNITED STATES: MALE-FEMALE DIFFERENCES, 2002-2016
Karthik Kolisetty
Epidemiology and Public Health, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 149
Mentor(s): James (Jim) Anthony, Madhur Chandra

In the United States (US), an estimated two percent of adolescents and adults recently used a prescription stimulant (e.g., Ritalin®, Adderall®) to get high, stay awake to study, or for other reasons outside medically approved boundaries (i.e., extra-medically). US estimates in recent years show some upward growth of this prevalence proportion, along with increased psychostimulant prescribing, especially for males. The evidence prompted us to study potentially increased incidence rates for both males and females as estimated in public-use datasets from the National Surveys on Drug Use and Health (NSDUH). Each year's NSDUH study population consists of non-institutionalized US community residents ages 12 and older, sampled for national representativeness (n~60,000), and assessed via standardized modules of questions during computerized self-interviews. An NSDUH Restricted-use Data Analysis System enables analysis-weighted estimation for year-pair samples drawn from 2002-03 through 2015-16. We produced seven year-pair-specific incidence estimates and Taylor series 95% confidence intervals (CI) for males and females separately. We then used Stata-15 to produce meta-analysis summary estimates. Our hypothesized male excess risk of starting to use psychostimulants extra-medically was not supported by this study's estimates. For males, estimated annual incidence, 2002-2016, is 0.29%, whereas for females the estimate is 0.38%, with substantial overlap of confidence intervals. Although we face possible self-report limitations, this unexpected male-female parity in previously under-studied psychostimulant incidence rates prompts us to extend the line of research and to consider issues not yet investigated thoroughly by others (e.g., progression from medical to extra-medical use).

DRUG DEPENDENCE ERADICATION FORECASTS, DRUG BY DRUG
Adnan Barazi
Epidemiology and Public Health, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 150
Mentor(s): Madhur Chandra, James (Jim) Anthony

Consider a 'counterfactual' United States (US) population affected by drug dependence syndromes (DDS) if we eradicated drugs one-by-one. An eradicated drug could not cause DDS. First, consider eradication of alcohol. How would US DDS burdens be affected if we eradicated alcohol? Then, consider heroin? Then cannabis (marijuana)? We hypothesized that alcohol eradication would be most influential. We produced estimates from multi-stage area probability sample surveys of US non-institutionalized populations age 12-years-and-older, 2002 -2013, with computer self-interviews assessing drug use and active DDS (n~60,000/year. Estimation involved analysis-weighted cross-tabulations andTaylor series estimating 95% confidence intervals (CI). Estimates indicate that the largest drug dependence disease burden reductions are achieved with eradication of alcoholic beverages. Overall, an estimated 4.7% suffer from active DDS, including alcohol dependence (CI = 4.7%, 4.8%). With alcohol eradication, that estimate drops 1.5% (95% CI = 1.4%, 1.5%). Substantially smaller reductions would be seen if we were to eradicate drugs such as heroin and cannabis. Our profile of estimates is depicted in 'radar' and 'spider web' plots that are produced using Stata-15 software in order to show the degree to which DDS burdens might be reduced by eradicating each drug under study. In our discussion of these results, we note limitations, but note that our study's empirical estimates confirm expectations that alcohol tops the list of drugs that create drug dependence syndromes as disease burdens and increase treatment caseloads. Other drugs grab media attention, but have substantially less influence on US disease burden metrics and DDS treatment caseloads.

THE HEALTH BENEFITS OF NATURAL SOUNDS: IDENTIFICATION OF THE INITIAL STEPS TO ADDRESS KNOWLEDGE GAPS USING SOUNDSCAPE MAPPING AND HEALTH DATA FROM A DETROIT NEIGHBORHOOD.
Claudia Allou
Epidemiology and Public Health, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 151
Mentor(s): Amber Pearson

Emerging research indicates that contact with nature, often defined as the time a person spends in greenspaces (e.g., parks), or within view of greenery, can benefit human health. Another dimension of contact with nature exposure to natural sounds (e.g., birdsong) appears to be largely unexplored. To identify the research extent in this area, we first conducted a systematic review. Two reviewers independently performed title/abstract screening (n=1663 articles), then full text for qualifying articles (n=177) via Covidence. Thirty-two articles were used to extract study details and findings, and only five of these quantified health outcomes rather than perception-based attributes. To address the little research examining the role of natural sound in human health we conducted a pilot study in Detroit (May-Aug 2018). We recruited 33 adults in one neighborhood. Participants completed a survey, including demographic data, perceived stress, depressive symptoms, neighborhood perceptions, as well as anthropometric measurements and blood test strips. To quantify the soundscape, we deployed Songmeters at four participants' homes and the neighborhood park. We listed to the recordings and annotated insect and bird sounds, from 5am-12pm for 4 days. Using counts of natural sounds, we estimated 'acoustic diversity', a sound diversity metric, at each site using a suite of acoustic indices (which quantify variation in the acoustic environment). We created a kriged soundscape map, assigned values to participants, and examined correlations with neighborhood characteristics and health. Our findings serve as an initial step in addressing the paucity of literature on the health benefits of natural sound.

ALL HARM, NO GOOD: FORCING MEDICALLY UNNECESSARY SURGERIES UPON INTERSEX NEWBORNS
Katie Whalen
Epidemiology and Public Health, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 152
Mentor(s): Sean Valles

The practice of performing medically unnecessary surgeries upon intersex newborns is an unethical way of preserving the socially constructed idea that homo sapiens are a sexually dimorphic species. Contrary to popular belief, human beings are not sexually dimorphic; there is a human sex spectrum. Medical institutions condemn the middle of the sex spectrum as pathological, only recognizing the ends of the spectrum as distinct sexes: "male" and "female". An intersex person has sexual anatomy that lies somewhere between these socially constructed categories. Up to 1.7% of babies are intersex. One of 2,000 babies deviate so greatly from these created categories of "male" or "female" that they will "need" surgery. In actuality, many of these surgeries are medically unnecessary. Medical professionals may pressure parents of intersex children to choose surgery for their newborns. These health care workers claim that intersex children may be bullied or rejected by society if they do not have cosmetic surgery. There is no evidence to back up these claims. However, there is much evidence that these surgeries can cause scarring, nerve damage, and psychological and physiological trauma. Health care professionals should only perform medically necessary surgeries in order to make sure intersex children's physiological needs are met. Other surgery upon reproductive anatomy should be postponed until intersex people are able to make their own decisions about their own bodies.

RACIAL INEQUITY IN PRETERM BIRTH AMONG COLLEGE EDUCATED WOMEN
Piper Brase
Epidemiology and Public Health, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 153
Mentor(s): Claire Margerison

Non-Hispanic Black (NHB) women have up to 2-fold higher rates of preterm birth (PTB, defined as birth <37 weeks gestation) compared to their Non-Hispanic White (NHW) counterparts, and it is often cited that this inequity exists even among women with a college education. However, this statistic is based on a small study (n=1,089) from the early 1990s. Our objective was to determine if this racial inequity in PTB among college-educated women still exists and to examine whether this inequity is explained by known risk factors for PTB. We analyzed US birth certificate data 2015-2016 among singleton births to women ages 15-44 with no missing data (n = 7,346,036). We limited analyses to women with a college degree or higher (n = 2,295,217). We used logistic regression models to estimate associations between

race/ethnicity and PTB controlling for known risk factors. College-educated NHB women had 1.86 (95% CI: 1.83, 1.89) times the odds of PTB compared to NHW women, in an unadjusted model. This odds ratio decreased to 1.73 (95% CI: 1.70, 1.76) after controlling for marital status. Further controlling for age, prenatal care and parity did not have a substantial impact on racial inequity of PTB. NHB women are at substantially higher risk of PTB compared to NHW women even at high levels of education. This racial inequity was not explained by age, prenatal care, or parity although marital status did contribute. Further research should examine whether stress or racial discrimination help explain the racial inequity in PTB.

THE IMPORTANCE OF QUALITY ASSURANCE (QA): EVALUATING PROTOCOL ADHERENCE OF CAREGIVER DELIVERY OF MEDITATION AND REFLEXOLOGY IN A MULTI-SITE NATIONAL CANCER INSTITUTE STUDY
Lindsay Runft
Epidemiology and Public Health, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 221
Mentor(s): Gwen Wyatt, Rebecca Lehto, Alla Sikorskii

This National Cancer Institute (NCI) study aims to improve symptom management for patients undergoing treatment for solid tumor cancers. The multi-site study uses the sequential multiple assignment randomized trial (SMART) design to accomplish this goal. To date, this study has enrolled 397 dyads (patient and friend/family caregiver) from 7 sites. Dyads were first randomized into a caregiver-delivered intervention (meditation or reflexology or control group) for 4 weeks. If symptom improvement is not achieved by week 4 in one of the intervention groups, dyads are re-randomized to continue 4 more weeks of the same therapy, or to add the other therapy. Participants are trained during the first two sessions by an expert practitioner in either meditation or reflexology. The intervener must ensure that the caregiver-delivery (reflexology) or participation in the intervention (meditation) is in accordance with the standardized study protocol. During the sessions the intervener fills out a quality assurance (QA) checklist that includes all required protocol elements to be delivered during the session. In addition, the intervener can record open-ended comments relative to each section. Proper review of the intervener's checklist and question/comment section is imperative to ensuring that the intervention procedures for meditation and/or reflexology are being correctly enacted. Summarizing comments and evaluating protocol adherence enhances intervention fidelity.

THE INVESTIGATION OF THE NATURAL MAKEUP MOVEMENT: WHAT ARE WE APPLYING ON OUR SKIN?
Olivia Garbacik
Epidemiology and Public Health, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 222
Mentor(s): Per Askeland, Carl Boehlert

The desire for natural products has grown in the beauty and skincare market. Thus, the comparison of natural and traditional makeup products became relevant and was enabled by the use of the scanning electron microscope. The scanning electron microscope allows for the observation of the topographies, densities and chemical compositions of various eyeshadows. Through the use of various methods of comparison, there are differences and similarities between natural and traditional makeup products in terms of health implications and the representation of the product which are being investigated.

AROMATHERAPY AS TREATMENT FOR ANXIETY, PAIN, POSTOPERATIVE NAUSEA, AND VOMITING
Payton Korhorn
Epidemiology and Public Health, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 223
Mentor(s): Jackeline Iseler

Nausea, vomiting, pain, and anxiety are symptoms and side effects that are a major cause for concern not only to patients, but to their healthcare providers as well. Anxiolytics and opioids have a myriad of side effects and can even lead to dependence. With cost of such medications and the opioid epidemic being a rising issue, the search for an alternative treatment continues at an increasing pace. This project seeks to identify aromatherapy as a viable treatment option. Through extensive literature searches using CINAHL, PubMed, and Web of Science, 15 studies have been found along with 8 literature syntheses that were written in the past five years and pertained to adults. Evidence suggests that inhaling the scent of lavender decreases anxiety and improves sleep quality; a handful of studies have statistical significant that lavender also decreased blood pressure. There's speculation that lavender can decrease pain as well. It

has also been shown that inhalation of a mixed variety of scents, including ginger, spearmint, peppermint, and cardamom will decrease postoperative nausea and vomiting. In this presentation, we will be discussing how lavender does decrease anxiety and improves sleep quality. In addition, we will discuss the effects that multiple aromas may have on nausea and vomiting in a clinical setting. Through these findings and our own pilot study, we hope to integrate aromatherapy into hospitals and other healthcare settings as a treatment option ultimately reducing healthcare costs, improving patient satisfaction, and reducing anxiety, nausea, vomiting, and medication use.

ADULTS WITH MILD COGNITIVE IMPAIRMENT AND THEIR ROLE IN CARE TRANSITIONS SHARED-DECISION MAKING: A LITERATURE SYNTHESIS
Julia Vicik
Epidemiology and Public Health, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 224
Mentor(s): Katherine Dontje, Linda Keilman

The purpose of this foundational project was to examine the literature to determine to what extent individuals 55 and older, with cognitive impairment, are involved in decisions encompassing their personal care transitions, and whether a gap in knowledge exists. Transitions of care is the movement of an individual between health care providers (HCPs), settings, and home as their condition or care needs change with aging. A number of barriers make transition decisions challenging, especially with the presence of mild cognitive impairment (MCI), a condition between the normal cognitive changes of aging and a measurable decline in cognitive abilities such as loss of short-term memory and thinking skills. One early recognition strategy for detecting MCI is through the Mini-Cog Rapid Screening Test. Short-term recall of three repeated words and clock drawing are the two measures that can identify cognitive impairment in older adults. Utilizing this 3-minute assessment tool with older adults in sub-acute rehabilitation (SAR) can help HCPs identify individual cognitive challenges and adapt their patient-provider approach in how they discuss and support transitions of care. Knowing an individual's cognitive status can also help HCPs strengthen and enhance the shared-decision making (SDM) that occurs with MCI individuals when involved in their care transitions. This mutually agreed upon SDM increases adherence to transition plans and results in increased satisfaction for the older adult, their family members, and the HPCs.

RELATIONSHIPS AMONG SMOKING, FOOD INSECURITY, AND STRESS AMONG LOW-INCOME HEAD START MOTHERS
Caitlin Zaremba, Jenna Brown
Epidemiology and Public Health, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 225
Mentor(s): Jiying Ling

A cross-sectional, correlational study was conducted to explore the relationships among smoking, food insecurity, and stress among low-income Head Start mothers. The University Institutional Review Board and Head Start administrators approved the study before data was collected. Thirty-five mothers were recruited from two urban Head Start centers. Among the 35 mothers, 42.9% were current or former smokers, 48.6% described their household as food insecure, and 37.1% described themselves as food insecure. About 22.9% (n=8) mothers had low stress, 65.7% (n=23) had moderate stress, and 11.4% (n=4) had high stress. Although no significant relationship was found between smoking and food insecurity status, 53.3% smokers and 45% non-smokers reported household food insecure, and 46.7% smokers and 30% non-smokers reported themselves food insecure. Mothers with household food insecurity reported higher distress (13.82 vs. 8.56, p=.004), but lower coping (8 vs. 10.39, p=.022) than those without food insecurity. Similarly, mothers with adult food insecurity had significantly higher perceived stress than those without adult food insecurity (23.15 vs. 14.77, p = 001). Moreover, smokers perceived to have higher, but not statistically significant, stress than non-smokers (19.67 vs. 16.55, p=.181). Mothers experiencing food insecurity in their household or personally are more likely to have higher perceived stress, and smoking may increase the probability of stress among mothers who are household or personally food insecure. Therefore, a stress management program is critically needed for mothers who are experiencing food insecurity. Including a stress management component into a smoking cessation program may help boost the program effect.

PREGNANCY HISTORY AS AN IMPORTANT PREDICTOR OF BODY MASS INDEX (BMI) IN 45-54 YEAR-OLD WOMEN
Melissa Henning
Epidemiology and Public Health, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 226
Mentor(s): Diana Pacyga, Rita Strakovsky

In mid-life, women have elevated risks of cardiovascular and metabolic diseases. Pregnancy causes substantial metabolic changes in women, but it is unclear whether these changes persist. Thus, we investigated associations between pregnancy history and mid-life overweight/obesity, accounting for menopausal status. Pre- and peri-menopausal women (n = 772) in the Baltimore Mid-Life Women's Health Study reported their demographics, health habits, and pregnancy history (numbers of live births/pregnancies and age at first birth/last pregnancy) via questionnaires. Height and weight were measured to calculate BMI. Multivariable logistic regression models assessed overall and stratified (by menopausal status) associations of pregnancy history and risk of mid-life overweight/obesity (BMI = 5 kg/m^2), controlling for a variety of important covariates. Ages at first birth or last pregnancy were not associated with mid-life BMI. Women whose pregnancies either did or did not result in a live birth had 44% (OR: 0.56; 95% CI: 0.32, 0.99; P<0.05) and 59% (OR: 0.41; 95% CI: 0.19, 0.87; P<0.05), respectively, lower odds of being overweight/obese at age 45-54 compared to women who had never been pregnant. However, in women who had been pregnant, the odds of being overweight/obese increased by 19% with every birth (OR: 1.19; 95% CI: 1.02, 1.40; P<0.05). In stratified analyses, these associations remained significant only in pre-menopausal women. In conclusion, in pre-menopausal women, having a history of pregnancy appears to be protective against overweight/obesity, but the protective effects diminish with every live birth. The discrete findings in pre- vs. peri-menopausal women warrant studies examining relationships of pregnancy history with BMI after menopause.

FOOD SCIENCE & HUMAN NUTRITION

BLACK BEANS, A NATURAL SOURCE OF BLUE COLOR: ANTHOCYANIN CONTENT AND STABILITY
Gasana Ingabiregasana
Food Science and Human Nutrition, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 154
Mentor(s): Sharon Hooper, Karen Cichy

Color is among the crucial factors that affect people's food choices. However, with the healthy and sustainable diet trends, people desire natural colorants over chemical additives, this is because natural colorants have additional health benefits as opposed to the synthetic dyes. Blue color is one of the natural colors greatly used in different foods but currently there are few natural colorants used; the commonly blue colorants used in foods are synthetic dyes: FD&C Blue 1 and 2. Anthocyanins are water soluble pigments that are found in plants. They are one of the flavonoid groups which are responsible for colors in many flowers, fruits and vegetables. Researches have shown that anthocyanins can be used as natural colorants in different foods. The goals of this research are to develop stable blue color extracts from anthocyanins found in black beans seeds coats that can be used as an alternative natural blue colors to synthetic colorants; determine the differences in anthocyanin concentration in eight black bean (*Phaseolus vulgaris*) genotypes as well as optimizing stability of the blue extracts using alkaline extracting solutions. Differences in color values using Hunter Labscan colorimeter were observed among the genotypes extracted with sodium bicarbonate (0.5%, pH 8.6), with L*(lightness) ranging from 1.54 to 2.52; a*(green to red) ranging from 1.76 to 1.98 and b*(blue to yellow) ranging from -0.1 to -0.7. The blue anthocyanin extracts were degraded to a brown color up on storage at room temperature for 72h. The results from this project will provide a natural blue colorants to be used in foods.

THE ALTERED COGNITIVE AND MOTOR FUNCTIONS THAT COFFEE BEANS PROVOKE BASED ON CHEMICAL COMPOSITION
Sophia Perrelli
Food Science and Human Nutrition, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 155
Mentor(s): Per Askeland, Carl Boehlert

Caffeine has been a long-standing method to stay alert and in good spirits. Its use is increasing worldwide, as it is the second most consumed beverage behind water. Shockingly, close to 1.6 billion cups are consumed daily. Some desirable

impacts it has on the human body are memory restoration, increased focus, happier moods, and improved motor performances all controlled through the central nervous system and the cardiovascular system. In fact, caffeine's locomotor activity stimulation caused it to be a problem in the Olympic Games, considering athletes who consumed 5-6 cups of coffee in a day were banned from the Games due to their unfairly enhanced motor functions. So, what causes these sought-after effects of coffee intake on our bodies and is it healthy? This research will be conducted using Energy Dispersive Spectroscopy (EDS) and Scanning Electron Microscopy (SEM) to explore how different coffee beans' (dark roast, varietal, and decaffeinated coffee) chemical compositions and structures impact bodily responses in humans. Surveys will be conducted on 100 people to gather information on the impacts these different coffees have on: cognitive aptitude tests, motor functions, mood, alertness, and to measure how long each blend takes to reach its maximum effectiveness. In the presentation of this research, I will be able to show detailed images of coffee beans and their makeup, in order to determine any toxic or healthy components of this seemingly miracle bean that keeps our world turning.

APFT STANDARDS AND PT TEST INFLUENCE ON ROTC CADETS EATING PATTERNS
Hannah Koch
Food Science and Human Nutrition, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 156
Mentor(s): Won Song

Obesity rates in the 18-29 year old population have increased nationally from 7.1% to 12.1% over the last two decades. This age group comprises 43.8% of the current military population. Despite the military's strict regulations, the military has followed national trends, increasing the obesity prevalence in recent years. Previous prospective studies show an association between eating disorder symptoms and future weight gain and obesity onset. It is believed that the high stress to meet military standards may pressure cadets to utilize any methods necessary to meet the military's demands. Implementing a qualitative study design that utilized in depth phone interviews,this research investigates the experience of ROTC Cadets meeting physical fitness standards and how it may influence their eating behaviors. Focusing on specific characteristics of the cadets will help to illuminate how various factors influence the cadet's stress related to the tests and their overall opinion of the test. These attributes include BMI, year in the program, and previous pass/ fail history in the PT Test and APFT Standards. The research ultimately aims to display how ROTC cadet's prepare to meet the APFT Standards and PT Test requirements, in regards to their dietary patterns and how these methods might differ for different demographics within the ROTC program, such as BMI status, year in the program, and previous pass/ fails in the tests.

CREATING A RISK MODEL FOR NOSOCOMIAL LISTERIOSIS IN CANCER PATIENTS WHO CONSUME READY-TO-EAT SALAD
Carly Gomez
Food Science and Human Nutrition, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 157
Mentor(s): Bradley Marks

Listeriosis is a foodborne illness with relatively low incidence, but substantial mortality rates. Risk of listeriosis is greater in immunocompromised populations, particularly cancer patients, because their treatments compromise several of the barriers against infection. Therefore, nosocomial foodborne listeriosis remains problematic for these patients, with consumption of ready-to-eat (RTE) fresh salads raising particular concern. Risk of listeriosis from salad consumption was assessed using an exponential dose-response model with rate constant r of 1.79E-10, adopted from a 1997 model that conservatively estimated risk of listeriosis for immunocompromised individuals. Food consumption data were collected from 100 patient surveys, with salad being defined as green lettuce, raw spinach, and/or raw tomatoes. Risk was calculated using Monte Carlo simulation in @Risk software. The hypothetical efficacies of two risk management strategies, washing treatments (stirring in water for two minutes, and immersion in sodium hypochlorite for 15 minutes followed by a tap water rinse) and storage (at 5 and 15°C), were also assessed. The risk of listeriosis due to fresh salad consumption during one cycle of chemotherapy was 0.000329 (0.033%). This is the mean value for risk in an average risk scenario; 90% of risk values were between 0.000009 and 0.001172. Neither washing treatment nor storage condition affected the dose of L. monocytogenes per serving of salad. Few consumption data-based risk models exist for this sub-population. Data-driven risk models for listeriosis in cancer patients could provide a justification for existing dietary restrictions.

PRELIMINARY DATA: DIETARY SUPPLEMENTATION WITH OMEGA-3 DOCOSAHEXAENOIC ACID REGULATES SILICA-INDUCED ACUTE LUNG INFLAMMATION IN AUTOIMMUNITY
Liz Ross
Food Science and Human Nutrition, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 158
Mentor(s): Preeti Chauhan

Both dietary and environmental factors influence the latency/severity of genome-driven autoimmune diseases. Previously, our lab has reported that installation of the environmental toxicant, crystalline silica ($cSiO_2$), triggers premature loss of self-tolerance in the lung of lupus-prone NZBWF1 mice, evidenced by cell infiltration, proinflammatory cytokine release, and tissue pathology. Numerous preclinical investigations have demonstrated that SLE patients may benefit from consumption of n-3 polyunsaturated fatty acids (PUFA) found in fish oil. However, its role in acute phase of early immune response has never been fully characterized. Here we tested the hypothesis that consumption of docosahexaenoic acid (DHA), an ?-3 polyunsaturated fatty acid, influences the early immune response in $cSiO_2$ -induced acute inflammation. To accomplish this, we assessed the early time-dependent effects of DHA consumption on $cSiO_2$-triggered acute inflammation in the lung. Cohorts (n = 8/gp) of 6-week-old female NZBWF1 mice were fed with isocaloric AIN-93G diet supplemented with 1% DHA. At 8 weeks of age, mice were then intranasally instilled with 2.5 mg $cSiO_2$ or vehicle and maintained on control or DHA rich diet for 1, 7, 14, 21, or 28 days post-instillation (PI). Cohorts were sacrificed on the respective PI time points, and the lung and bronchoalveolar lavage fluid (BALF) were analyzed. Preliminary analysis demonstrates that $cSiO_2$ exposed mice with the DHA supplemented diet had reduced macrophage and lymphocyte pulmonary inflammation, as well as decreased levels of inflammatory cytokines linked with adaptive immune cell recruitment.

FOOD PROCESSING EFFECT ON FATTY ACIDS PROFILE OF MOST CONSUMED PRODUCTS IN USA
Nama Naseem
Food Science and Human Nutrition, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 159
Mentor(s): Lisaura Maldonado, Ilce Medina Meza

Fat intake is highly regarded as a way to monitor a person's overall health. Food products containing little to no fat are considered to be better for consumption. However, fat is an essential part of a diet as it increases vitamin absorption, contributes to muscle movement, and can even lower the risk of heart disease. Although, some fats should be eaten less than others. Saturated fats, which largely come from animal products and several dairy products, should be limited as it can lead to artery blockages. Unsaturated fats, including monounsaturated (MUFAs) and polyunsaturated (PUFAs), allow for health benefits. By extracting lipids from high priority meats, ready to eat products, and fast foods, the fatty acid methyl esters (FAME) profile for saturated and unsaturated fat were derived using GC analytical method. Cooking methods for meats were varied and it was found that pan frying can change the fatty acid content due to frying oil and heat transfer. In most cases, the unsaturated fat increased (16.12% - PUFAs for pork chops) while saturated fat lowered (7.38% - SFAs for pork chops) after pan frying. Ready to eat foods that contained eggs had high amounts of polyunsaturated fat with a maximum of 60.71% of PUFAs for macaroni salad. This is confirmed by the liquid structure of egg yolk at room temperature compared to the solid structure of butter at room temperature. Ultimately, public knowledge on how food processing can alter the composition of foods can encourage Americans to lead healthier lifestyles.

INFLUENCE OF COW DIET ON LIPID OXIDATION IN CHEDDAR CHEESE
Kaylan Hayman
Food Science and Human Nutrition, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 301
Mentor(s): Zeynep Ustunol, Javier Salas

Cheese is a staple of the human diet all around the globe. While cheese is a great source of important nutrients like protein and calcium, it is also high in saturated fat. Cheeses made from the milk of pasture-fed cows are low in saturated fat, and high in beneficial unsaturated fats and antioxidants. Unfortunately, they are also low in calcium, which contributes to the texture of cheese as well as its nutritional appeal. A proposed solution is to standardize milk from traditionally grain-fed cows with cream from pasture-fed cows, and use the resulting hybrid milk for the cheese making process. In doing so, all health benefits of pasture-fed cheese are conserved while maintaining the nutritional and

structural benefits of grain-fed cheese. A potential problem with this innovation is the increased susceptibility of pasture-fed cheese to lipid oxidation, due to its high unsaturated fat content. Presently, this investigation seeks to evaluate the degree of lipid oxidation in grain-fed, pasture-fed, and hybrid Cheddar cheese after 14 weeks of aging using the thiobarbituric acid reactive substances assay.

BODY IMAGE PERCEPTIONS AND EATING BEHAVIORS IN RESERVE OFFICER TRAINING CORPS (ROTC) CADETS AT A MIDWESTERN UNIVERSITY
Allegra Picano
Food Science and Human Nutrition, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 302
Mentor(s): Won Song

Previous research suggests the presence of at-risk eating behaviors in association with enforced physical fitness standards in Army ROTC Cadets. Little is known about the influences of these standards and their associations with body image concerns within this population. In an effort to identify if and how body image is an important construct in ROTC related to eating behaviors, we aimed to describe ROTC Cadets' self-perceptions of body image in comparison to body image perceptions within the context of ROTC. Qualitative data was collected through one-on-one semi-structured phone interviews between researchers and 18 ROTC Cadets. Interview questions were developed to probe Cadets' eating behaviors and body image perceptions within ROTC. All interviews were recorded, transcribed verbatim, and coded using thematic coding. Preliminary findings indicate that most ROTC Cadets display positive perceptions of body image outside of the ROTC environment. These perceptions are thought to change when ROTC cadets evaluate their body image in the context of ROTC standards. Most Cadets reported a perceived connection between unhealthy diet and lack of exercise with negative body image. Negative body image displayed by ROTC Cadets in preparation to meet ROTC standards tests may put ROTC Cadets at increased risk for at-risk eating behaviors. Findings from this research indicate the potential need for nutrition education to support military performance without increasing risk for at-risk eating behaviors and body image concerns in this population.

GMO VS NON-GMO KALE: COMPARISON OF GROWTH PATTERN
Narindra Randriamiarintsoa, Miriam Kaburu
Food Science and Human Nutrition, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 303
Mentor(s): Steven Safferman, Steve Marquie, Georgia Peterson

Since the beginning of the twenty-first century, genetically modified crops have been used by several countries around the world to ensure sustainable food security. Mutations are a natural inevitable process and expediting the process only serves to better crop value and save resources. Genetically modifying kale seeds give the plants an edge when it comes to growth factors such as adaptability to different environments. This research sought to compare growth patterns of GMO and non-GMO kale seeds in a bid to understand the competitive ability of genetically modifying seeds and crops. GMO and non-GMO seeds of "Red Russian" kale were planted and their germination rate, height, and response to a specific fertilizer compared. Some of the seedlings were exposed to a water-deprived environment, considered as the harsh condition, in order to evaluate their performance. Data was collected and inferences made from it.

TART CHERRY EXTRACT REDUCES OXIDATIVE STRESS AND INFLAMMATION MARKERS IN MACROPHAGES
Travis Goeden
Food Science and Human Nutrition, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 304
Mentor(s): Jenifer Fenton

Montmorency tart cherries (MC) have an abundant and unique profile of bioactive components compared to other berries. In humans, MC concentrate consumption reduces exercise induced inflammation and oxidative stress, blood pressure and alters lipid profiles. However, MC ability to reduce oxidative stress resulting in vascular damage is poorly described. Therefore, our working hypothesis is that MC cherry concentrate will reduce oxidative stress biomarkers in macrophages, a key immune cell that contributes to vascular inflammation and damage. To test this hypothesis, the RAW 264.7 macrophage cell line was treated with 10 mM 2,2-azobis (2-amidinopropane) dihydrochloride (AAPH) to induced oxidative stress as measured by reactive oxygen species production (ROS). Then, macrophages were co-

treated with AAPH and varying doses of MC extract from 1-100 μM to determine if MC extract could block AAPH-induced ROS. Oxylipid and cytokine production were measured along with cell viability. AAPH application increased ROS and cytokine production and reduced cell viability. Co-treatment with MC extract decreased AAPH-induced ROS, nitric oxide and cytokine production in a dose-dependent manner; the optimal dose was 50 μM MC extract at 24h. Co-treatment with MC extract increased cell viability in a dose dependent manner; the optimal dose was 50 μM extract at 24h. MC extract may be effective in reducing inflammatory and ROS-mediated signals to prevent oxidative stress and inflammation and protect from vascular damage leading to CVD. However, less is known about the in-vivo effects of MC extract, signifying an area for future study.

CONTENT ANALYSIS ON T1D POSTS ON INSTAGRAM
Phoebe Tuyishime
Food Science and Human Nutrition, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 305
Mentor(s): Deanne Kelleher

The current study presents a content analysis of Type 1 Diabetes (T1D) nutrition messages on Instagram as it is a popular tool used to acquire T1D nutrition information. Social media has been widely used as a medium to share information, including nutrition information, to a wide variety of audiences. However, the quality of information on social media has been questioned by many health and nutrition professionals. Research demonstrates that there is a growing influence and use of healthcare and nutrition information obtained online (The Harris Poll, 2011). For instance, patients with chronic conditions like T1D use social media frequently to communicate with other patients whom they might be having similar health conditions to gain deeper knowledge and support by sharing ehealth information. We will carry out a content analysis of the information using quantitave and qualitative methods to assess the nutrient density of nutrition related T1D posts on Instagram. A search of Instagram posts will be conducted using popular T1D hashtags. We will carry out a content analysis of the information qualitatively using a coding system where posts with the same themes will be analyzed. We will also evaluate T1D nutrition information on Instagram quantitatively using the 2015-2020 Dietary Guidelines for Americans.

DEVELOPMENT OF BOVINE DNA FINGERPRINTING METHOD TO MINIMIZE CONSEQUENCES OF OUTBREAKS OF BACTERIAL CONTAMINATION IN BEEF.
Olivia Mackraz
Food Science and Human Nutrition, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 306
Mentor(s): Patrick Venta

Beef plays a large role in most consumer's diets. However, the meat can also be occasionally contaminated with pathogenic bacteria such as Salmonella and E.coli. If the contaminated beef products could be tracked it would make it easier to contain the contaminated products. It has not been possible to use dinucleotide simple tandem repeats (diSTRs) to identify individual animals in mixed samples, such as hamburger. This is due to a technical artifact called stutter that is substantial in diSTRs (30%). When these markers were originally developed, it was believed that markers with longer motifs (with lower stutter) did not exist in cattle. The hypothesis for this research was that useful STRs with longer motifs do exist and, if so, to develop a panel of them to identify the animals or animal products in mixed samples. In this lab the Smith-Waterman sequence alignment scores have been shown to correlate with heterozygosity. Using these scores, markers were Identified in the bovine reference genome. PCR primers were developed and the markers were shown to have useful genetic variability. These markers were fluorescently labeled to allow high resolution genotyping. Ten markers, each on a separate bovine chromosome, were developed with observed and expected heterozygosities of 0.51 and 0.65 using 11 Angus beef samples. Of the 10 markers there were 2 tetraSTRs, 5 pentaSTRs, and 3 hexaSTRs. The average stutter was 6% for tetraSTRs, 3% for pentaSTRs, and 2% for hexaSTRs. These unique markers now make it possible to identify individuals in mixed meat samples.

EFFECT OF NOVEL SOUND WAVE MILLING VS CONVENTIONAL KNIFE MILLING ON NATIVE AND HEAT PRE-TREATED WHOLE DRY BEANS (PHASEOLUS VULGARIS) FOR INGREDIENTS
Anna Akariza
Food Science and Human Nutrition, Oral Presentation
Section: 3, 8:30 AM, MSU Room
Presentation Number: 721
Mentor(s): Sharon Hooper

Currently, food industries are using impact mills such as hammer and knife mills to obtain powdered ingredients. These mills generate a large amount of heat during the milling process and which can affect the properties of the flours generated. The functional properties of bean flours are critical to the quality characteristics of the final food product. Therefore, pretreatment and milling techniques are important for flour quality determinations. The objective of this study is to compare the functional and nutritional properties such as color, water absorption capacity, emulsion stability, particle size distribution and protein contents ofheat treated and untreated black bean (Zenith and Zorro) and navy bean (Medalist and Merlin) flours milled via a knife mill and a novel sound wave mill. Results show that sound wave milled treated and untreated whole navy bean (Medalist) flours had similar lightness, L* values to all purpose wheat flour (90.8 vs 91.2 vs 92.2). Black bean flours produced using the sound wave mill, had L* values that were lower than those generated by the knife mill (78.5 vs 81.9). This may be due to more pigment being released during the sonic milling process. Additionally, the sonic wave mill was able to produce bean flours with varying protein contents ranging from 13% to 35% while the knife mill generated bean flours with approximately 21%. In general, sound wave milled bean flours had lower moisture contents when compared to knife milled products (4% vs 10%) which is important for shelf life. The sound wave milling technology is can be used to obtain shelf stable bean flours.

THE RELATIONSHIP BETWEEN THE ORAL MICROBIOME AND AGE, BMI, AND SWEETNESS PERCEPTION
Eliot Haddad
Food Science and Human Nutrition, Oral Presentation
Section: 3, 8:45 AM, MSU Room
Presentation Number: 722
Mentor(s): Sarah Comstock

The human oral microbiota consists of all the microorganisms residing in the oral cavity and has been linked to a range of factors such as lifestyle habits, drinking water, and genetics. Using 16S rRNA DNA gene sequencing methods to analyze over 300 citizen science oral microbiome samples collected at the Denver Museum of Nature and Science, we observed a significant negative relationship between the richness of the oral microbiome and adult BMI, but no relationship with the perception of sweetness. Additionally, richness and abundance of the adult oral microbiome decreased with age. By analyzing overall beta and alpha microbial diversity, our methods differ from previous studies that only considered the relationship between age, disease, and increases in specific microbial species. Our results align with those of a previous study that reported decreased oral microbial richness in obese individuals[5]. Although some research has shown that there may be an association between the nasal microbiome and olfactory perception[6], the effect of the oral microbiome on factors such as taste is not prevalent within the literature. A follow up on this study may seek to identify specifically which bacterial species diminish with age and increased BMI. Furthermore, other variables such as diet, mental acuity, and exercise may be analyzed to obtain a more in-depth idea of wellbeing and the oral microbiome. By identifying certain desirable parameters of oral microbial composition, health goals can be established that may serve to improve overall public health in the long-term.

EFFECT OF CAYENNE PEPPER EXPOSURE ON ALPHA DIVERSITY OF THE GUT MICROBIOTA
Aashka Chhabria
Food Science and Human Nutrition, Oral Presentation
Section: 3, 9:00 AM, MSU Room
Presentation Number: 723
Mentor(s): Sarah Comstock

Gut bacteria are important in multiple body functions such as the immune response. The gut microbiome is being studied in depth to learn new ways in which humans can better maintain gut health, and in turn achieve a better quality of life. The purpose of this study is to investigate how the integration of 1g cayenne pepper to daily diet will affect alpha and beta diversity of bacteria in the gut microbiome. This study is a randomized cross over intervention. Participants provided three fecal samples: prior to cayenne pepper integration, one week after consuming probiotics (TruBiotics and Primadophilus Original) and tomato juice, and one week after consuming probiotics, tomato juice, and cayenne pepper. DNA was extracted from samples using the Qiagen DNEasy Powersoil Kit. PCR was done to amplify the V4 region of the

16S rRNA gene and then 16s libraries were sequenced. Mothur was used to organize the sequencing data. R was used to compare alpha and beta diversity of the gut bacteria present in the fecal samples across treatments. Exposure to cayenne pepper in the presence of probiotics did not affect the alpha or beta diversity of the gut microbiota; however, there were clear groups of participants with high Prevotella or high Bacteroides abundance. Although the 1g dose of cayenne did not affect gut microbiota alpha and beta diversity in this small sample of adult participants, future research using larger doses of cayenne or a more focused population for intervention, such as obese adults, may demonstrate an impact.

EXPERIMENTATION OF MATERIAL DEVELOPMENT PROCESSES FOR INCORPORATING SPENT COFFEE GROUNDS INTO PLASTICS FOR PACKAGING APPLICATIONS
Jennifer Le
Food Science and Human Nutrition, Oral Presentation
Section: 3, 9:15 AM, MSU Room
Presentation Number: 724
Mentor(s): Eva Almenar Rosaleny

Spent coffee grounds (SCG) is a byproduct from the coffee industry that results in 6 million tons annually worldwide. In order to leverage this byproduct, it is used in various applications such as soil fertilizer, production of biofuels, etc. However, there is minimal research on the use of SCG in plastics for packaging applications. This research explored the incorporation of SCG into a common plastic used in food packaging, linear low-density polyethylene, to replace polymer matrix and progress toward a more sustainable film. The mixing operation of these two components were investigated to understand its effect on film properties in regard to mechanical and barrier properties. Mixing operation parameters such as speed and time were examined. Results revealed that the mixing operation impacted the film properties and thus, the potential of the film for packaging applications.

BUTYRATE PRODUCTION CAPACITY IN FECAL SAMPLES FROM PREGNANT WOMEN AND THEIR INFANTS
Kristen Schmidt
Food Science and Human Nutrition, Oral Presentation
Section: 3, 9:30 AM, MSU Room
Presentation Number: 725
Mentor(s): Sarah Comstock, Kameron Sugino

Butyrate is a short chain fatty acid produced by the gut bacteria during breakdown of fiber in the intestine. Microbial metabolites, such as butyrate, are important for regulating host metabolism. In this study, the level of the butyryl-CoA:acetate CoAtransferase (*but*) bacterial gene from Roseburia/Eubacterium (RosEub) was monitored. We collected fecal samples from two cohorts: (1) women during pregnancy and post-partum (PEAPOD; n=25) and (2) women during pregnancy and their infants (ARCH/BG; Mom (n=42), 6M (n=38), 12M (n=36)). DNA was extracted from the samples and qPCR was used to detect *but* gene. Abundance of *but* was compared to maternal pre-pregnancy BMI. Infant *but* counts were compared by breastmilk exposure and women's *but* counts were compared by their dietary diversity score. Copies of *but* increased significantly from 6M to 12M to maternal samples, following an assumed increase in dietary diversity across these time points. 6M consuming no breastmilk had significantly more copies of *but* than those who had consumed any, suggesting diet may mediate this relationship. Mother's pre-pregnancy BMI tended to be positively correlated with both maternal and 12M *but* gene counts. Number of *but* copies was similar between the PEAPOD women across pregnancy and post-partum. Overall, mother's dietary diversity was positively correlated with *but* copies. Variability in dietary diversity of ARCH/BG mothers is larger than PEAPOD, and a similar pattern is seen by greater *but* abundance variability among ARCH/BG mothers. As evidenced by this data, butyrate production capacity is associated with dietary intake.

BIFIDOBACTERIUM STRAINS IN MOTHERS AND THEIR BABIES
Lynn Ferro
Food Science and Human Nutrition, Oral Presentation
Section: 3, 9:45 AM, MSU Room
Presentation Number: 726
Mentor(s): Sarah Comstock

Bifidobacterium are found in the GI tract. They reduce inflammation and improve intestinal function. Little is known about the strains of *Bifidobacterium* that may be transferred from mother to infant. Mother and baby fecal samples during pregnancy and after birth were analyzed to determine the presence of *Bifidobacterium* strains (*B.Longum*, *B.Breve*, *B.Infantis*). The objective was to determine which strains were present and the effects of pregnancy on

Bifidobacterium. DNA was isolated from fecal samples (25 women at 24weeks gestation (M2); 6weeks post-partum (M3); infant at 6weeks of age (B1)) and used in quantitative real-time PCR. *B.Longum* was present in over half of mother samples (M2:64%; M3:71%) and 36% of infant samples, while *B.Breve* and *B.Infantis* showed limited presence. All mothers positive for B.Longum at M2, also tested positive at M3, and of five infants who tested positive for B.Longum, all of their mothers tested positive at M2 and M3. No M2 and M3 samples were positive for B. Breve. Three of 13 (23%) baby samples tested positive for B.Breve. Two M2 samples tested positive for *B.Infantis*. No M3 samples tested positive for B.Infantis, but 2 infant samples did test positive for *B.Infantis*. Infants and mothers that tested positive for B.Infantis were not paired dyads. Typically, B.Infantis has a prevalence of 0-32.4% and B. Longum has a 21-100% prevalence. This study population harbored no *B.Breve*, but demonstrated a typical abundance of *B.Longum* and *B.Infantis*. Our next step is to determine the prevalence of these strains in a separate cohort of pregnant women.

IMPACT OF CAYENNE PEPPER ON INTESTINAL INFLAMMATION: A RANDOMIZED CROSS-OVER TRIAL IN ADULT HUMANS
Katelyn Murphy
Food Science and Human Nutrition, Oral Presentation
Section: 3, 10:00 AM, MSU Room
Presentation Number: 727
Mentor(s): Sarah Comstock

In the colon, high levels of the proteins Calprotectin and Lipocalin-2 act as markers for intestinal inflammation. With higher concentrations, the human intestine is at greater risk of developing diseases like irritable bowel syndrome or diverticulitis. The objective of this research was to determine if daily consumption of a probiotic and tomato juice mixed with 1g cayenne pepper would lower the concentrations of these proteins compared to consuming the probiotic with tomato juice alone. Volunteers of varying weight and sex served as their own control in this randomized cross-over study. Fecal samples were collected before the experiment began, just after a week with no cayenne and just after a week with cayenne consumption. Proteins were extracted from feces using two different buffers, each specific for one of the inflammatory proteins. These extracts were used in ELISAs specific for calprotectin and lipocalin-2 as well as for total protein assessment by Bradford assay. The ELISA was completed for the Calprotectin extracts, and 13/20 (65%) of participants had lower calprotectin levels after consuming tomato juice with cayenne compared to consuming tomato juice with no cayenne. Of the 7 obese participants, 5/7 (71%) had lower calprotectin levels after consuming cayenne. This was not different from chance (p=0.13). The average calprotectin levels without treatment were 175ng and on treatment were 273ng. A Friedman test demonstrated that these two paired distributions were not significantly different from one another (p=0.18). In conclusion, a 1g dose of cayenne per day for 5 days did not significantly affect fecal calprotectin levels in healthy adult humans. The results from this research will be used to inform the design of future studies in the area of spices and human intestinal inflammation.

HISTORY, POLITICAL SCIENCE, & ECONOMICS

LOOPING THROUGH HISTORY: COLLECTING, ANALYZING, AND VISUALIZING THE MOST COMMON NEWS TOPICS OVER TIME
Hattie Pimentel, Hunter Kuchek, Rhett Pimentel
History, Political Science and Economics, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 307
Mentor(s): Ezra Brooks

Scientists often gather observations of the world using images and need efficient image annotating tools to extract data from these images. For instance, biologists interested in understanding the joint motion of an iguana might record a video of the iguana, and then select points in the iguana's knee joints frame-by-frame. Project Insight seeks to make this process easier and quicker. The project consists of two parts: first, an image annotation package, the Graphical User Interface (GUI); and second, behind-the-scenes machine learning. When Project Insight is completed, data from the GUI will be sent to the machine learning component, which will attempt to anticipate the user's next choices. The machine-learning component will search through algorithm space for the most suitable algorithm. Jupyter Notebooks are an interface used by researchers to combines code, pictures, notes and other multimedia. Using Jupyter Notebooks, several image annotation tools were created. Currently, the image annotation tools are being moved to a future replacement of Jupyter Notebooks: JupyterLab. Citing security concerns, the JupyterLab team blocked key JavaScript execution in the beta version of JupyterLab. This means that many programs that worked in the original Jupyter Notebooks, including most of the Project Insight programs, are not functional in JupyterLab. This

presentation will cover multiple attempts to retaining functionality in JupyterLab and discuss why the JupyterLab's security block hinders functionality and contrasts the accessible theme of JupyterLab.

ATTORNEY GENDER INFLUENCE ON THE U.S. SUPREME COURT
Michelle Nowicki, Christine Francoeur, Hana Lerwick, Alexis Smith
History, Political Science and Economics, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 308
Mentor(s): Ryan Black

When considering the magnitude of the Supreme Court and its decisions, political scientists have explored many factors that influence their rulings. Often, we see research that is focused on the sitting justices' ideologies, strategies, and personal histories. However, by acknowledging the impact of the attorneys arguing cases, we can analyze this institution through a new lens. By pulling data on the attorneys who presented their cases, we can examine the Supreme Court with an added depth. Our goal while analyzing the data is to see what role gender plays on the final decision. Specifically, if the counsel's gender influences their likelihood to be a part of the Supreme Court bar; to be lead attorney; justices' reception of the argument and their attorney questioning patterns; if high profile cases are likely to be argued by female or male attorneys; and to what degree gender limits or propels their cases. President Rutherford B. Hayes signed a law allowing women to be admitted into the Supreme Court bar on February 15, 1879 (2018). This was only five short years after Bradwell vs. The State (1872), which allowed Illinois to block women from its state bar. In 1880, attorney Belva Lockwood became the first female attorney to argue before the Court in Kaiser v. Stickney (1880). This leaves a short amount of time in which female attorneys presented before the Supreme Court. By collecting data on attorneys starting in 1879, we will be able to see what trends have changed over time.

SUCCESS IN THE SUPREME COURT: THE CORRELATION BETWEEN NUMEROUS APPEARANCES AND A FAVORABLE RESULT
Madeline Broderick, Lauren Bolt, Jasmine Jordan
History, Political Science and Economics, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 309
Mentor(s): Ryan Black

We know that the Supreme Court sees hundreds of briefs per term. Each side of the case has to write a merits brief, which outlines its legal argument. However, we know little about the attorneys who write the briefs that cross the justices' paths. We analyze attorney data from Supreme Court briefs published from the years 1979-2008 to see which firms are writing these briefs. We do not include the executive branch in our original data, since the number of appearances by the Solicitor General or Attorney General are much larger than any other law firm, and there is already significant data showing that these two positions have high case success rates. Our questions are: does the frequency of appearances of a specific firm influence the rate in which that firm wins Supreme Court cases? If so, is there also a correlation between location of the firm and their success rate? We expect to find that yes, the frequency with which a firm appears on a brief is positively correlated with the number of cases won. We also expect to find that the closer to D.C. the firm is, the more successful that firm is before the Court.

ENERGY POLICY IN SPAIN AND THE EU
Allie Virginski
History, Political Science and Economics, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 310
Mentor(s): Norman Graham

Although Spain is somewhat limited with its ability to implement new energy policies as the country is tied to the European Union, overall trends show that Spain is capable of lessening its energy dependence on foreign countries and instead focusing on domestic sustainable energy opportunities. This is evident through its efforts to increase renewable energy use. Spain is the fifth country in installed wind power, and considered a world leader for installed solar power. In addition, the country relies heavily on nuclear energy as nearly 20% of its energy comes from nuclear reactors located around the country. Due to Spain's production, assembly, and distribution of nuclear parts nuclear energy continues to be a cleaner and more independent form of energy. Spain has also become increasingly interested in pursuing shale fracking as a potential way to lessen dependence on foreign energy imports.Through the use of renewable energies, nuclear energy, and a possible future of shale fracking Spain has the opportunity to lower its dependence on foreign

energy inputs. By 2030 the European Union has policies to increase renewable energy and reduce greenhouse gas emissions. The European Union is hopeful by 2050 to achieve a climate neutral economy, further decrease in greenhouse gas emissions, and increase use of carbon capture and storage techniques. I argue in this paper that Spain will achieve substantial energy independence by 2050. Potential constraints on this prospect include regional protests of shale fracking, and a just transition deal for coal workers and their surrounding communities.

STATE LAW EFFECT ON INCIDENCE OF HATE CRIMES: A COMPARISON BETWEEN CANADA AND THE UNITED STATES
Allie Pail, Nicole Jedding
History, Political Science and Economics, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 311
Mentor(s): Michael Stamm

The recent release of FBI hate crime statistics show a 17 percent increase in the number of reported hate crimes in the United States over the course of 2017, the third year in a row there has been a rise in reported hate crimes. A similar situation is unfolding in Canada, only magnified: reported hate crimes escalated by 47 percent from 2016 to 2017, the fourth year in a row reflecting this pattern in Canada. The principal goal of this research is to ascertain if state/province laws affect incidence of hate crimes differently in the United States and Canada. The analysis incorporates hate crime prevention legislation and its corresponding annual reported hate crime statistics in both countries, utilizing representative samples of states and provinces, specifically focusing on Ontario and New York. Additionally, this research will consider the bias motivation categories for reported hate crimes in Canada and the United States to determine if the underlying catalysts behind hate crimes are related to how policies do or do not affect incidence of certain categories and not others.

DYNAMIC CHANGES IN THE JOB LANDSCAPE OF SILICON VALLEY
Carson Gates, Michael Most
History, Political Science and Economics, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Ballroom
Presentation Number: 312
Mentor(s): Michael Adetayo Olabisi

Silicon Valley has undergone many changes in its evolution from a small peach community into the giant hub of technological development it is today. During this, a large blue-collar labor force came and went while high level jobs remained. These changes have been analyzed largely around the concept of free trade, with a focus on competitive penetration, term semantics, and trade gains. This presentation analyzes the specific shifts that have occurred graphically from three standpoints: the decline of manufacturing, the education shift, and the role of government policy. These implicate the nationwide incentives from trade agreements as the main reason manufacturing was outsourced, especially in Silicon Valley. We attempt to mathematically relate imports and the decline of manufacturing. Our findings show that the trends of manufacturing decline, increased trade and changing workforce needs are set to continue. Even if incentives to trade and outsource jobs were revoked, the trends would not revert easily.

THE IMPACT OF FOOD CHOICES ON THE ENVIRONMENT AND THE POTENTIAL FOR NUDGES TO REDUCE MEAT AND DAIRY CONSUMPTION: A LITERATURE REVIEW
Samyuktha Iyer
History, Political Science and Economics, Oral Presentation
Section: 2, 3:00 PM, Lake Erie Room
Presentation Number: 731
Mentor(s): Katherine Alaimo

Behavioral economics has become an increasingly popular tool used to "nudge" people towards better choices. There has been some success in the use of nudges when it comes to retirement savings, food choice in school cafeterias, and littering. There are numerous behavioral economics methods that have been studied in a variety of fields but this paper will focus on the effectiveness of defaults, price incentives, informational messages and labeling, and rewards and incentives. This paper conducts a literature review to study which of these methods have been most successful to see whether any of them can be applied in sustainable food choice. Environmental issues are quickly becoming an urgent matter we need to address, and animal agriculture is a huge contributor to climate change. If nudges can be used to reduce meat and dairy intake at the individual level, it could help decrease some of the damage.

ROBIN HOOD: FACT OR FICTION
Ben Raab
History Political Science and Economics, Oral Presentation
Section: 2, 3:15 PM, Lake Erie Room
Presentation Number: 732
Mentor(s): Emily Tabuteau

Some children envision themselves dressing up in disguise to help people in need. They read tales about vigilantes through modern day media. Perhaps they have heard of the medieval legend known as Robin Hood and may wonder whether he actually existed. Research shows that the notion of Robin Hood stealing from the rich and giving to the poor was only an idea and that no such crusader ever existed. However, his name may very well have been real. There are many references to variations of the name throughout Medieval English records. One name in particular, Robhood, is in the court rolls of Walsham Le Willows from the 14th century. This piece explores the possibility that Robhood may have been one of many pre-cursors to the name Robin Hood, and although he may not have stolen from the rich to give to the poor, his name does have a place in history.

THE ROLE OF INTERNATIONAL COOPERATION ON TRADEMARK ENFORCEMENT
Emily Osika
History Political Science and Economics, Oral Presentation
Section: 2, 3:30 PM, Lake Erie Room
Presentation Number: 733
Mentor(s): Kari Kammel

The role of international cooperation through several transnational bodies provides countries the ability to cooperate on trademark enforcement mechanisms, allow for informative dialogue, and develop a global agenda on trademark enforcement. This is important because trademark violations are a global concern, in which countries and industries share an invested interest. Between the United States, China, and Brazil, international cooperation has aided in the spread of information and joint enforcement operations; however, barriers to cooperation still persist. Such barriers hinder the spread of information, as well as enforcement capabilities on a global scale. These limitations allow for the continuation of trademark violations; hence, the ability to purchase counterfeit goods in the global marketplace remain prevalent. The methods to eliminate barriers are complex; therefore, they require a unified effort from the international community to help reduce the production and spread of counterfeit goods.

FACT OR FANCY? THE CONFLICTING APPROACHES OF CLASSICAL ECONOMISTS AND MID-NINETEENTH-CENTURY ENGLISH NOVELISTS TO UNDERSTANDING INDUSTRIAL CAPITALISM
Anna Esenther
History Political Science and Economics, Oral Presentation
Section: 2, 3:45 PM, Lake Erie Room
Presentation Number: 734
Mentor(s): Ronen Steinberg

This presentation will be about how fiction authors and economists responded to the emergence of industrial capitalism in England. A lot of economic changes were happening in England between the late-eighteenth century and mid-nineteenth century. Cities grew exponentially, many people worked for wages in factories instead of farming the land, and the poor crowded together in new urban slums. Fiction authors like Charles Dickens, Elizabeth Gaskell, and Benjamin Disraeli wrote novels to express their criticisms of the poverty and mass misery they saw around them, while economists like Adam Smith, Thomas Malthus, David Ricardo, and Jeremy Bentham came up with theories. The two different kinds of sources reflect their two different perspectives: novelists believed in the power of compassion and imagination to relieve the suffering of the individual, whereas economists looked to statistics and calculation to determine the best course of action for the population. Our society is still grappling with questions about industrialization, poverty, and capitalism today and it is imperative to interpret those issues both from the economic perspective and the human perspective.

HUMANITIES

MANOOMIN//WILD RICE: EXPLORING THE POTENTIAL FOR AN MSU INDIGENOUS WALKING TOUR
Montgomery Smith
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 596
Mentor(s): Brooke Linsenbardt

The Michigan State University (MSU) American Indian Indigenous Studies (AIIS) Department has long provided cultural, political and academic teachings to improve the university's support of Indigenous programs, faculty, staff, and students, communities, and ongoing Indigenous presence in academia. The AIIS program continues to introduce educational opportunities on campus and the surrounding communities to further this departmental mission. For the spring semester of 2019, the department partnered with the Introduction to American Indian Indigenous Studies course (AIIS 201), to develop a theoretical Indigenous Walking Tour. Our course developed many stops that embody the physical, religious, historical, and cultural Anishinaabe presence that preexisted the foundation of MSU; the presence continues through the student body, faculty, and staff on campus today. My poster will elaborate on the Indigenous Walking Tour project and its partnership with the AIIS Department, along with one potential walking tour "stop" highlighting the significances of Manoomin // wild rice, in Michigan. Manoomin is a medicinal, ceremonial, economic and dietary provider for the Ojibwe, Odawa, and Potawatomi Nations. The recent rapid changes in climate and the treatment of natural resources in the region has resulted in an eminent threat to the presence and persistence of Manoomin. Through an introduction of Manoomin, this presentation will provide a visual and contextual example of the potential for creating an Indigenous Walking tour on campus, along the Red Cedar river, while emphasizing its prospective impact in highlighting the presence of Indigenous cultures and identities in academia.

CREATIVE EXPRESSIONS OF INFERTILITY
Emma Langschied
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 597
Mentor(s): Robin Silbergleid

I am conducting research with The ART of Infertility, a non-profit focused on creating art exhibits and documenting oral histories of infertility to support and educate on the disease. Our purpose is to compile an anthology of creative writing and art and eventually put forth a book proposal. We want to gather peoples' experiences with infertility and present their stories in a published collection. I research various books of different genres including memoir, comedy, and poetry as well as blogs featuring infertility experiences to find potential contributors for the anthology. This is also to determine the types of infertility narratives and art already published. I am open to all infertility narratives in my research, but I am also specifically looking for narratives featuring people underrepresented in infertility literature such as LGBTQ persons, single parents by choice, men, and infertility stories with a religious bent. In my research, I am also noting publishers of infertility narratives to help determine where The ART of Infertility may eventually want to send the book proposal. I will also conduct a workshop for English 200 to encourage students to write about infertility experiences or relationships with their bodies and reproductive processes. Through this research, I will explore the creative ways infertility is understood, coped with, remembered, and accepted. Ultimately, I hope to connect my exploration of infertility with other bodily processes and diseases such as blood disorders and how they too, can be explored creatively through narrative and art.

ENCULTURATION OF MUSIC
Sarah Geist, Natasha Desouza, Eiryn Hodges, Adam Weickersheimmeraustad
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 598
Mentor(s): Natalie Phillips

This research addresses the way in which people reference popular culture when trying to assimilate the experiences and perceptions they receive while listening to musical compositions of varying styles and genre. The Music and Narrative study, conducted by the Digital Humanities and Literary Cognition (DHLC) and Timing, Attention, and Perception (TAP) Labs at Michigan State University, partnered with the University of Arkansas to conduct this study. Participants listened to eight classical music excerpts, four Western and four Chinese, out of a total corpus of 32

excerpts. They were then asked to write down what they were thinking about during the listening. Not only was it found that people tended to think of stories but it was found they each story seemed to share elements of the other stories generated by the participants. More profound was the curious derivatives of each story. It was found that many of the narratives consisted of references to popular culture through film, fictional characters, and fictional places. Our approach to understanding this data was to deriving quantitative data from qualitative responses through categorization and comparison. Our goal is to further explore the way in which the brain responds to music as well as examine the ways which we go about assigning cultural phenomena to certain musical signatures.

DOCUMENTING HOUSING DISCRIMINATION IN LANSING, MI, 1930s-1950s
Claire Marks-Wilt
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 601
Mentor(s): John Aerni-Flessner

Urban Renewal generally refers to redevelopment projects involving the removal of blighted housing or building structures and the addition of replacement structures that are theoretically stimulating economically. Lansing, Michigan attempted several urban renewal projects, including the construction of Interstate 496 from 1963-1970 and in the area around the Oldsmobile/General Motors Grand River Assembly Plant. Similar to many other narratives of Urban Renewal throughout the 20th century, neighborhoods housing African American residents were disproportionately affected. Thus, African American residents living south of downtown Lansing were removed from their homes in preparation for the urban redevelopment projects and were forced to face federally backed redlining processes, on-contract housing, and racially based housing discrimination. By using real estate cards from the CADL archives I was able to map a narrative of the 300 to 1500s blocks of Olds Avenue from the 1930s to 1950s. The blocks on Olds Avenue transitioned into a neighborhood that slowly changed to allow African American occupants, starting on the east side of Olds Avenue and progressing to the west. The transition also shows the class divides within the African-American community by the marketing practices of those selling houses. The gradual shifts in these neighborhoods, and the strong communities that were present in the neighborhood suggest when the Urban Renewal projects of the 1960s were so disruptive to communities that were predominantly African-American. This research exemplifies topics such as redlining, on-contract housing, and racially based housing discrimination while also reflecting the racial composition of Olds Avenue, as it transitioned from a largely caucasian concentrated neighborhood, to a primarily African American neighborhood. This research shows the process of redlining and the use of discriminatory housing practices.

THE INTERSECTION OF ACCESSIBILITY AND USER EXPERIENCE
Kate Whalen
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 602
Mentor(s): Kate Sonka

Making a conscious decision to design a product, service, or system for just one target user group is discriminatory. User experience (UX) architects must ensure they are producing something that is inclusive and accessible for a diverse target group. To create an accessible experience, a designer must have a diverse and empathetic mindset to better understand the impact accessibility and inclusion will have on the lives of their customers with and without disabilities. Implementing simulations is not always enough and UX designers must include various diverse users in the design process to better understand how they interact with the designs and what impact the design choices have on them. Using an inclusive design process integrates accessibility into the products from real, diverse users of the product. This poster will highlight findings from research conducted on the intersection of user experience and accessibility that sought to answer three questions: 1) How can UX designers gain empathy and relate better to all users to create experiences that ensure maximum accessibility?; 2) How should the consideration of accessibility differ depending on the type of UX design process throughout product development?; and 3) How can UX designers better understand the importance of physical, digital, and hybridized accessibility in the experiences they are creating? Early findings suggest there are still many strides to be made in the intersection of user experience and accessibility. Early findings suggest that implementing ethnography, empathy, and an inclusive design approach into the product development process from the beginning can improve the accessibility and user experience for all.

LITERATURE, NEUROSCIENCE, AND AESTHETIC PLEASURE: THE SCIENTIFIC AND HUMANISTIC INTERPRETATION OF CLOSE READING OF POETRY
Tori Hopper, Lauren Powell, Isis Woods
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 603
Mentor(s): Natalie Phillips

Poetry's ability to elicit intense emotional responses has been analyzed through a variety of humanistic approaches. However, many have been hesitant to utilize methods common to the sciences to further this line of inquiry. An ongoing poetry study performed by the Digital Humanities and Literary Cognition (DHLC) lab at Michigan State University aims to interrogate the commonly assumed relationship between aesthetic pleasure and emotional response. The interdisciplinary nature of this research utilizes the strengths of statistical analysis to buttress the methods of literary analysis used in this investigation. For this project, English undergraduates from Michigan State University were tasked with reading sixteen sonnets twice. First, participants read the sonnets to familiarize themselves with their language. After reading each sonnet a second time, participants were prompted to rate different qualities of their reading experience on a scale of 1-10, including how positively or negatively they felt and how aesthetically pleasing they found the poem. There is a statistical correlation between feelings and aesthetic pleasure, meaning participants were more likely to find poems that made them feel positively to also be aesthetically pleasing. While this correlation is interesting in itself, it overlooks outlying participants who reported negative feelings toward poems that were found especially aesthetically pleasing. This finding suggests that negative feelings and the experience of aesthetic pleasure are not mutually exclusive, and actually appear concurrently. Ultimately, this research shows how literary analysis informs statistical findings by teasing out nuances in the data that may otherwise be overlooked.

COMPARISON IN FINDING AESTHETIC IN POETRY: ENGLISH VS. NON-ENGLISH MAJORS
Mitch Carr, Talia Cohen, Kara Swanson, Jasmine Young
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 604
Mentor(s): Natalie Phillips

The Digital Humanities and Literary Cognition (DHLC) lab at Michigan State University is conducting an interdisciplinary study of sonnets seeking to understand the moments in poetry that provide aesthetic pleasure or displeasure by using the brain as an analytical tool. We are comparing classically trained English majors to non-English major, and our preliminary results indicate that English majors experience moments of aesthetic pleasure differently than non-English majors. The implications of these results would suggest an English majors training influences the ways in which they appreciate literature. Specific to our study, a classically trained English major is a participant who has taken at least nine English credits; and aesthetics is defined as a pleasing, powerful, or profound moments. M. Jacobs' article: "Neurocognitive poetics: Methods and Models for Investigating Neuronal and Cognitive-affective Basis for Literary Reception" demonstrates the way one's brain constructs the world in and around us by the use of aesthetic and emotion theories. This article contributes to our study because it measures the ambiguities (hidden moments) in poetry that only an English major would know causing them to have a different understanding than non-English majors. Our study requires participants to read eight Elizabethan and eight Petrarchan sonnets; each having an overarching positive or negative theme. We inquire about how each participant feels while reading the sonnets by having them respond to them in several ways. First, participants highlight moments they found aesthetically pleasing or displeasing, next they response to a scale of 1-10 measuring their feelings, lastly they fill in open ended questions. We predict that our research will indicate that classically trained English majors will not only observe the hidden moments in each sonnet more so than non-English majors, but also find more aesthetic pleasure in the negatively themed sonnets.

BECOMING AN EDITOR: LEARNING THROUGH WORK EXPERIENCE
Estee Schlenner
Humanities, Oral Presentation
Section: 2, 11:00 AM, MSU Room
Presentation Number: 741
Mentor(s): Anita Skeen

For this project, related to my work as an Undergraduate Research Assistant for Professor Anita Skeen, and her work for Wheelbarrow Books and as a teacher at Ghost Ranch Education and Conference Center in Abiquiu, NM, I will be discussing how my assistance to her has taught me necessary skills for becoming an editor. My research was not by any

particular method, but rather through the experiences I had with reading and commenting on manuscripts submitted for the Wheelbarrow Books Poetry Prize, and collaborating with Anita to create an anthology of work from the students in her writing class at Ghost Ranch in October 2018. These assignments have provided me with the experience of reading unpublished work, copyediting, corresponding with writers whom I had never met before, formatting a manuscript in Adobe InDesign, designing a cover for a book, and much more. The research method was more project based, but I think that working this way has given me more experience because I learn better using hands-on methods. While I have acted as a reader, a writer, and an artist before, working on these projects has allowed me to act in all of those positions at once, giving me the opportunity to integrate multiple creative sides of myself.

BLACK GIRLHOOD: THE AFFECTS OF INCARCERATION ON MENTAL HEALTH
Claire Nowinski
Humanities, Oral Presentation
Section: 2, 11:30 AM, MSU Room
Presentation Number: 743
Mentor(s): Tamara Butler

Black Girlhood studies is a relatively new interdisciplinary field focusing on the daily struggles and lives of Black girls. This field concentrates on Black girls, Black girl literacies framework, and Black feminist theory, to name a few. Scholars of Black Girlhood studies are committed to providing the needs, support, safe spaces, and the success and wellbeing of Black girls. An aspect of Black Girlhood that I am centering my project around is the wellbeing of Black girls. As a Black Girlhood curator, the research I'm going to present will be an essay that focuses on the effect's incarceration has on Black girls and their mental health. There are three directions my research will go, first is how incarceration effect's incarnated Black girl's mental health. Secondly, I want to see how it effects Black girl's mental health who have loved ones incarcerated. The third and last direction of my research will be discussing the importance of spaces for the wellbeing of Black girls. Some forms of research that will be used in my essay are books, personal stories/interviews, scholarly articles, and statistics. Through these sources, I strive to educate and collaborate with others to make a change in the perspectives on how society portrays, studies, and views Black Girlhood.

TEMPLES, TIGERS, THAILAND, OH MY!: ETHICAL AWARENESS THROUGH HANDCRAFT AND DESIGN
Mikayla Frick
Humanities, Oral Presentation
Section: 2, 11:45 AM, MSU Room
Presentation Number: 744
Mentor(s): Rebecca Schuiling

The research in this project is centered on techniques used in flatbed knitting as well as handcraft. As a research assistant, I am working with my faculty member to explore the relationship between knitted dress and the body using nontraditional materials to create new forms. The work that I am doing within our context is centered around material creation to emulate the silhouette of the Thai elephants residing within sanctuaries. This research considers how knits and knitwear are like a second skin, receiving the imprint of our bodies. Accordingly, knitting can be a powerful metaphor when used as visual political rhetoric. We are developing innovative textural design using nontraditional material. In the presentation and in my own work, I use design to nonverbally tell the stories of life by fashioning the good from within the bad. By creating an avant-garde silhouette, I am pushing against the societal expectation of dress and the notion that clothing is simply utilitarian. In doing so, I am provoking an emotion that will draw attention to the quality of life of the Thai tigers. This research will further inquire into the ethical ramifications of the Tiger Temples in Thailand. I will examine the different uses of the knitting machines while also incorporating traditional hand techniques such as crochet. Crochet is a process of creating fabric by interconnecting loops of yarn, thread, or strands. The work will metaphorically draw upon the need for interconnection between different beings.

RACE, WRITING, RHETORIC, AND AMERICAN CULTURES
Katrina Stebbins
Humanities, Oral Presentation
Section: 2, 12:00 PM, MSU Room
Presentation Number: 745
Mentor(s): Kate Birdsall

As of October 2018, Michigan State University has an enrollment of 50,351 undergraduate students. Students of color make up about 24% of that population (about 10,000 students), which the school has touted as a contribution to the university's "most diverse student body to date." However, within the Department of Writing, Rhetoric, and American

Cultures and, more specifically, the Professional Writing major, people of color make up about 12% of the student body (about 20 students). This lack of diversity is stark, and it raises questions regarding causation. Drawing on both published literature in whiteness studies and interviews with people of color within WRAC about their experiences, this research seeks to understand that lack of diversity and its source. The examination and subsequent findings were synthesized in a podcast which utilizes recorded commentary and dialogue with interviewees. It examines whether there is a stigma of whiteness or white culture surrounding the humanities and how ethnic/cultural identity affects students when selecting a major in order to identify a cause of the absence of diversity in the Professional Writing major and WRAC.

DUAL-IDENTITY IN THE CONSCIOUSNESS OF THE BLACK MALE'S MENTAL HEALTH
Norrlyn Allen
Humanities, Oral Presentation
Section: 2, 12:15 PM, MSU Room
Presentation Number: 746
Mentor(s): Kevin Brooks

The importance of the research I am conducting is to determine the impact double-consciousness has on the psyche of Black men. It is my hypothesis that the occurrence of two identities; one appeasing the standard of professionalism and the other receiving social acceptance from one's identifying culture dismembers the origin of the individual. The idea of self-love and self-efficacy become distant as confusion and self-hatred arises due to disconnection from one's identity due to constant validation needed from the approval of colleagues and counterparts. Through a creative presentation utilizing clips, interviews, and poetry I convey the implications of denouement of personal experiences that infer universal effects of mental health in black men due to living a life of double-consciousness.

THE ROLES OF THE ARTS AND HUMANITIES IN YOUTH EMPOWERMENT PROGRAMS
Gillian Gahn
Humanities, Oral Presentation
Section: 2, 12:30 PM, MSU Room
Presentation Number: 747
Mentor(s): Kevin Brooks

Civic engagement is about going out in the community, and seeing what problems people are having, and saying, "These are the resources and skills I have, how can I best assist you?" It is about building a relationship that is beneficial for all parties involved. Incorporating the arts and humanities into youth empowerment programs is vital because the arts help boost confidence, help youth find a sense of purpose, and a sense of belonging. They also promote cognitive and social skills, democratic decisions, group work, and empowerment. The humanities include working with other people, building relationships out in the community, discussing current social issues, and problem solving. By incorporating these skills into youth empowerment programs, they give the youth more tools to succeed and become the best that they are capable of being. With this in mind, these perspectives developed my understanding of civic engagement and guided my participation during civic engagement activities. Therefore, this paper reflects on my roles in three youth empowerment programs where I created lesson plans and facilitated weekly sessions on social and emotional learning as well as promoted healthy living and literacy for students in kindergarten through 12th grade. These experiences have given me great insight into what works and what does not work for various types of youth empowerment programs. This presentation explores the importance of creating successful youth empowerment programs that incorporate the arts and humanities.

INTEGRATIVE & ORGANISMAL BIOLOGY

WATER VELOCITY INFLUENCES WATER QUALITY
Arezu Forouzandeh, Hamza Kaakarli, Alexa Richardson, Jake Petish
Integrative and Organismal Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 351
Mentor(s): Hamza Kaakarli, Jake Petish , Alexa Richardson

Nonpoint-source pollution has had a devastating effect on national water quality. This led to an interest in determining how the velocity of a river influences its ability to efficiently cleanse itself of agricultural pollutants. We compared the water quality between upstream agricultural sites and downstream non-agricultural sites, on two different rivers: the

Red Cedar River and Vermilion Creek. We chose these locations because the Red Cedar River has a higher water velocity than Vermilion Creek, which allowed us to directly compare the influence of velocity on pollutants in the water as it flowed downstream. At each location, we measured the velocity and collected invertebrates. We used the invertebrates to calculate a Biological Index Value of the river at each sampling site. We first compared upstream and downstream locations of the two rivers. Then, we compared the differences between the two locations across both rivers. In Vermillion Creek, the downstream location had significantly better water quality than the upstream location ($p<0.001$). In the Red Cedar, the change in quality was not significant ($0.5>p>0.4$). Vermilion Creek, the stream with the slower velocity, displayed an improved Biological Index Value at a significantly greater rate from the agricultural to non-agricultural area (31.91%) than that of the Red Cedar River (4.17%) ($p<0.001$). This suggests that slower flowing rivers can more efficiently cleanse themselves of pollutants. The practical application of this study allows for more responsible placement of future agricultural sites.

ALTERATIONS OF SENSORY BIAS BETWEEN CHEMICAL AND VISUAL CUES OF THREE-SPINE STICKLEBACK *GASTEROSTEUS ACTULEATUS* DUE TO CHANGES IN PH
Ben Wurst
Integrative and Organismal Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 352
Mentor(s): Janette Boughman, Robert Mobley

Three-spine Stickleback fish (*Gasterosteus aculeatus*) possess a multitude of sensory systems that adjust behavior based on environmental cues. Two of those systems, olfaction and vision, have been studied at length regarding the environmental cues they are associated with. Bimodal interaction, the combination of the two, is less studied but is a vital part of understanding the way individuals survey and react to their surroundings. However, human-driven pollution can alter pH of water bodies and the interaction between the sensory systems and environment may change. Thus, the preference to use one sensory system over another may be an indicator of the impact of pH differences. Environmental data shows parts of the world are experiencing decreases in pH, and increased acidity has been linked to disruption of chemical reception in aquatic organisms. To investigate the impact pH has on wild three-spine stickleback fish from British Columbia, individuals were introduced to symmetrical tanks that housed on either end a single or bimodal stimulus that was randomized with each trial. Preference for a visual, olfactory or bimodal stimuli was measured by the amount of time a subject spent with that stimulus. Trials were repeated with a pH treatment to associate changes in behavior with a different pH environment. Three-spine sticklebacks are ubiquitous in lakes and rivers worldwide and are a model organism for studying behavior and ecology. They present a unique opportunity to see how continued acidification can alter the sensory system of aquatic organisms and the impact pH may have on the ecosystem as a whole.

DO GIGGLES FUNCTION TO RECRUIT ALLIES?
Joe Burke, Carmen Calvillo, Brooke Boger, Jarred Lenoir
Integrative and Organismal Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 353
Mentor(s): Kenna Lehmann, Kay Holekamp

Animals use vocal communication constantly to spread information to one another yet, very little vocalizations have been decoded. One particular mammal that has a very rich vocal repertoire is the spotted hyena (Crocuta Crocuta). One of the vocalizations of the spotted hyena Crocuta Crocuta that has been largely unstudied is the giggle. The current understanding of giggle function is that they can encode personal identifying information but, this is a very general understanding. This research is important because it will give us a better insight into vocal communication in not only hyenas, but mammals in general. Here we used three years of behavioral notes on known individuals that emitted a giggle in response to receiving aggression to test the hypothesis that the giggle vocalization functions to recruit allies. We recorded all hyenas that arrived within the 5 minutes following the emission of a giggle. It is known that hyenas can identify kin and preferentially assist kin, therefore, we are expecting that arriving individuals will be closely related to the giggler. We will be comparing average relatedness of the clan and average relatedness of who arrives using a paired t-test and box plots to determine if the arriver can be considered an ally of the giggler. We will be using this data to determine the relationship between hyena giggles and ability to recruit allies. Our hypothesis predicts that when a hyena giggles a closely related ally will arrive and assist. Recruitment is an essential process in which animals socialize and survive.

THE EFFECTIVENESS OF STUDENT CONTRIBUTIONS IN ESTIMATION OF AVIAN DIVERSITY BETWEEN DIFFERENT HABITAT TYPES IN MALAYSIA AND INDONESIA
Jillian Burgess, Kahlan Robinson
Integrative and Organismal Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 354
Mentor(s): Pamela Rasmussen

Ornithologists utilize a number of techniques when measuring avian species richness for a given area, but these generally require extended fieldwork and costly resources. These estimations of avian diversity have long been considered prerequisite to effective conservation planning and management. Recently, eBird (ebird.com) has become an efficient and highly accessible crowdsourced database that allows the general public to contribute to the global documentation of bird diversity and distributions. Using this online resource, we attempted to measure how effectively student groups are able to document avian diversity over a short period of time. At several localities in Malaysia and Indonesia, bird counts were conducted by two undergraduate student groups in various habitat types: dry forest, wetlands, lowland rainforest, and montane rainforest. For each location, we compare species diversity and abundance as observed by our groups to that of the seasonally commonly occurring species as documented by cumulative records on eBird. We hypothesize that we would have documented a higher percentage of the total expected species in dry forest compared to rainforest, and in lowland rainforests compared to montane forest. We discuss how student groups can effectively contribute to studies of avian diversity in short periods of time.

IDENTIFICATION OF POLLEN RESOURCES USED BY LEAFCUTTER BEES, *GENUS MEGACHILE* (HYMENOPTERA: MEGACHILIDAE) IN CENTRAL MICHIGAN
Michael Killewald
Integrative and Organismal Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 355
Mentor(s): Rufus Isaacs

Many landscapes throughout the Great Lakes region have experienced reductions in floral and nesting resources for bees. Identifying the resources used by bees in the family *Megachilidae* can be used to inform conservation programs that aim to support this group. In this study, we identified the preferred nesting substrate and stem size, as well as the proportion of distinct pollen types used for offspring provisioning by *Megachile*. A total of 39 completed artificial nesting tubes were collected between July 25 and August 30, 2016. A majority of completed nests were in 4 mm diameter tubes. However, more 6 mm and 7 mm diameter stems were occupied later in the season. A total of 98 cells from 20 stems were analyzed for the composition of the pollen provisions. Nesting females gathered pollen primarily from *Trifolium repens*-type (70.2% of total pollen) and the majority of collection of this species occurred between July 25 and August 10. There was also frequent pollen collection from *Centaurea stoebe* (9.0%), *Rudbeckia*-type (8.4%), and *Cirsium* spp. (8.3%) with the majority of collection from these species occurring after August 10. Our results show that *Megachile* species exhibit strong preferences for specific nest hole sizes, and that they collect pollen primarily from non-native plants. This information can guide efforts to build local populations of these summer-active bees using combined nesting and foraging resources.

AVIAN DUETTING IN RELATION TO HABITAT TYPE AND ELEVATION ON EITHER SIDE OF WALLACE'S LINE
Hannah Hipkiss
Integrative and Organismal Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 356
Mentor(s): Pamela Rasmussen

Avian duetting is an intraspecific vocal behavior that may transmit information between mates regarding reproductive status and predator presence, and serves in territory defense and mate guarding. Duetting species are typically resident in complex low-elevation environments. My study analyzes the role of habitat characteristics in the evolution of duetting behavior on either side of Wallace's Line, the boundary between the Oriental and Australasian biotic realms. This project tests the hypothesis that duetting behavior is more common at low elevations and that it is convergently similar on either side of Wallace's Line. While a participant on an Education Abroad program, I captured sound recordings of avian vocalizations in Sabah, Borneo, Sulawesi Utara, Komodo National Park, and Flores Island using a Telinga Pro microphone and parabola with a Nagra Ares recorder in July-August 2018. In subsequent analyses, I used Raven for sound visualization and spectrograms sourced from Macaulay Library, xeno-

canto, and AVoCet for identification of unknowns and to increase sample size. For each recording I determined specific identity and vocalization type (solo or duet). Tree species diversity data was collected at Sepilok and Poring, Sabah and Nantu, Sulawesi by measuring tree height with a clinometer, circumference of trunk, pH of soil, elevation, and phenotypic characteristics of each tree. Statistical analysis will be performed on vocal and ecological data to assess correlation. To further test my hypothesis, future data collection should encompass much longer periods of dedicated recording time, be performed solitarily, and include more high-elevation sites.

EVALUATING THE BIODIVERSITY OF HERPETOFAUNA OF BORNEO (MALAYSIA) AND SULAWESI (INDONESIA)
Julian Guzman
Integrative and Organismal Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 357
Mentor(s): Pamela Rasmussen

The islands of Sulawesi and Borneo are on opposite sides of Wallace's Line, the boundary between two ecozones with extremely different biotas and high endemism. The reptiles and amphibians of Malaysia and especially Indonesia are relatively poorly known, and many are still being discovered today. Deforestation has severe impacts on reptiles and amphibians, many of which are highly sensitive to habitat change. My goals were to determine whether the number of herpetofauna species in each of these regions is correlated with canopy height and cover, and how similar the herpetofaunas are. I tested these hypotheses during an Education Abroad program by surveying two randomly selected sites in old secondary forests, the Rainforest Discovery Center, Sepilok, Malaysian Borneo, and Nantu Forest, Sulawesi, Indonesia. I photographically documented each reptile and amphibian to allow for later identification. I recorded data such as exact coordinates, height above ground the animals were found, weather, time and date, and compared these data with canopy height and canopy cover, which were determined by other students. Using Chi-square goodness of fit tests, I found no significant correlation between canopy height and canopy cover with the number of species recorded at either site. Two species of herpetofauna overlapped and were found in both sites. 23% of the animals found in the Rainforest Discovery Center are endemic to the island of Borneo whereas only 14% in Nantu Forest are endemic to Sulawesi. My data was limited, and further research should be conducted over longer periods and should include nocturnal surveys.

MOBBING IN SPOTTED HYENA-LION INTERACTIONS
Sarah Raisch, Adam Krause, Tracy Markray, Summer Eckhardt
Integrative and Organismal Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 421
Mentor(s): Kenna Lehmann, Kay Holekamp

Communication plays a key role in animal societies; it is important in social learning, coordination of movements, and the identification of individuals. Animals use communication to transmit information about identity, status, mood, future actions and environmental discoveries such as predators and food. One unique species characterized by complex social structures and a variety of vocalizations is the spotted hyena (*Crocuta crocuta*). Spotted hyenas frequently compete with lions for food and space; this competition is often direct, and hyenas often 'mob' lions by approaching as a cohesive group to drive lions away. As the spotted hyenas begin to congregate, they produce various vocalizations such as whooping and giggling; these vocalizations appear to initiate and facilitate mobbing, but little research has been done in this area. We hypothesize that an average volume of hyena vocalization needs to be reached before mobbing can occur. We are studying video footage taken in Kenya and creating spectrograms from the sound files taken from the videos. We measure changes in volume during the 10 minutes leading up to the mob, identifying any patterns in vocalizations emitted before and during the mobbing event. We predict that an average volume increase must be reached before the hyenas will mob, and that louder mobs will correlate with the hyenas successfully driving the lions away.

DISENTANGLING POST-FIRE IMPACTS ON POLLINATION SUCCESS OF TRICHOSTEMA LAXUM
Thomas Zambiasi
Integrative and Organismal Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 422
Mentor(s): Marjorie Weber

Pollinators perform an important role in plant reproduction, but pollinator community characteristics and variation in plant traits may both influence pollination success. After a wildfire burned several populations of turpentine weed

(Trichostema laxum), pollinator communities changed and plants grew larger. In burned populations in 2016, the year following fire, outcrossing rates decreased. However, it was not possible to say whether this change was caused by larger plant sizes or a different pollinator community. By 2018, the pollinator community in the burned areas had changed back to smaller bodied pollinators, providing the opportunity to decouple pollinator and plant size for pollination success. In the lab, I grew seeds gathered in 2018 in previously burned areas and estimated the relationship between outcrossing rates and plant size in the 2018 pollinator community background. I will compare these outcrossing rates with parent plant size using a linear regression. When compared to the corresponding results from the 2016 data, the slope and intercept of the regression's equation will allow us to determine the new pollinator community's effect on the plants if they are better or worse at pollinating, if they impact the outcrossing rate, or if only plant size has any real effect. The results presented, alongside earlier data, have the potential to demonstrate the mechanism by which pollination success changes following a major disturbance event such as a wildfire.

THE IMPLICATIONS OF DYNAMIC RODENT ANTI-PREDATOR BEHAVIOR FOR DISEASE ECOLOGY
Jeremiah Eaton
Integrative and Organismal Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 423
Mentor(s): Robert Montgomery

Predation is a fundamental ecological process that shapes trophic dynamics via top-down influence along both lethal and nonlethal pathways (e.g., by altering prey behavior). Recent research has suggested predators can influence disease dynamics by changing the behavior of reservoir-competent hosts. A prominent example is Lyme disease, which is transmitted to humans by *Ixodes* ticks that often obtain the disease-causing bacteria from rodent hosts. Initial evidence indicates that canid predators regulate Lyme disease via their effects on rodent prey. One proposed mechanism is that rodents decrease activity when under predation risk (i.e., the risk-activity hypothesis), which in turn reduces their tick load, and subsequently, tick infection rates. We measured the effect of red fox (*Vulpes vulpes*) predation risk on rodent activity levels across two temporal scales: i) a long-term scale that represented seasonal predator activity, and ii) a short-term scale that represented immediate predator presence. We simulated immediate predator presence by placing visual and olfactory red fox cues at 60 experimental sites and estimated seasonal red fox activity using data from 207 camera traps. We found that red fox cues reduced rodent activity across all sites, providing experimental evidence in support of the risk-activity hypothesis. Additionally, rodent response to cues depended upon long-term predator activity, with the most pronounced response occurring in areas of high long-term risk. This interactive effect suggests that the ability of predators to influence disease dynamics via antipredator behavioral responses in prey is itself dynamic and ultimately contingent upon prevailing seasonal predator space use.

MECHANISMS MEDIATING REDUCED JUVENILE SPOTTED HYENA SURVIVAL IN THE PRESENCE OF LIONS IN THE MASAI MARA NATIONAL RESERVE, KENYA
Abby Thiemkey
Integrative and Organismal Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 424
Mentor(s): Kenna Lehmann, Kay Holekamp

Healthy ecosystems are complex structures involving many interdependent relationships. These relationships often include trophic cascades that occur due to the addition or removal of a level within a food web. Predators are known to affect animals at lower trophic positions in food webs via top down effects. How these top down effects influence species within the same trophic level is less well understood. Studies have shown that interactions among predator species affect their habitat use, movements, and survival, as well as prey abundance and population distribution. If an apex predator is removed from an ecosystem, then meso-predators may expand and increase in density. One striking apex-meso predator relationship is that between lions (*Panthera leo*) and spotted hyenas (*Crocuta crocuta*), although both are top predators within the Serengeti ecosystem, hyenas show a meso-predator release when lion populations are low. Lions are also a threat to hyena populations by direct killing, kleptoparasitism and competition. Watts and Holekamp (2009) found that lions have a negative effect on juvenile hyena recruitment, but the mechanism mediating this effect is unknown. Here we test three hypotheses about the mechanisms governing lion's negative effect on juvenile hyena survival. 1) If lions are directly killing hyena juveniles, then there should be an increase in juvenile injuries obtained during lion-hyena interactions, 2) If lions are indirectly affecting juvenile survivals through food competition, the number of lion-hyena fights will increase as lions increase within the territory, and 3) If lions are affecting juvenile survival by indirectly altering hyena space use, then adult hyenas should travel further from the center of the territory with their

offspring to make kills to avoid attracting lions and other hyenas. This work should shed considerable light on the factors regulating population density of this large gregarious carnivore.

THE FUNCTION OF INFANTICIDE BY FEMALES IN A LARGE SOCIAL CARNIVORE
Ally Brown
Integrative and Organismal Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 425
Mentor(s): Kay Holekamp, Eli Strauss

Infanticide, or the killing of offspring by another member of the same species, occurs in many species of vertebrates. Although both males and females can commit infanticide, sexually selected infanticide by males has been the primary focus in studies of infanticide. In contrast, the prevalence and function of infanticide by females is less well understood. Here we use 30 years of data collected from several clans studied in the Masai Mara National Reserve and Amboseli National Park in Kenya to describe the prevalence and function of infanticide in the spotted hyena (*Crocuta crocuta*), a matrilineal and matriarchal carnivore that lives in mixed-sex clans ordered by a rigid dominance hierarchy. Hyenas breed year-round and raise their cubs in communal dens concurrently with other mothers from the same social group. Here we document cases of infanticide at the communal den and explore hypotheses regarding the function of infanticide in this species. We find that infanticide is a significant source of mortality experienced by den-dependent cubs. Victims were equally likely to be male or female, but in all observed cases the killers were adult females. Killers tended to be higher-ranking than the mothers of victims, suggesting that infanticide serves as a form of reproductive suppression of subordinate females by dominant females. We interpret our results in relation to hyena biology and to social competition among females more generally.

EFFECTS OF VEGETATION TYPE AND WINDOW CHARACTERISTICS ON RATES OF BIRD WINDOW COLLISION FATALITIES
Cam Mcauliffe, Oliver Autrey
Integrative and Organismal Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 426
Mentor(s): Pamela Rasmussen

Billions of birds, consisting of hundreds of species, migrate annually from North America to the tropics and back again, relying on magnetism, vision, and learning. Despite their astounding navigational skills, human activity that alters the natural landscapes often leads to the untimely death of migrating birds. Chief among these hazards are windows, which evolution has not equipped birds to perceive as obstacles. Artificial night lighting in urban areas and daytime reflections in glass windows of the sky and vegetation confuse migrants and cause them to collide with the glass. Conservatively, between 365 and 988 million individual birds die annually from window collisions in the United States alone. Partnering with Michigan Audubon, students and other volunteers monitored several buildings on Michigan State University's campus and in downtown Lansing during spring and fall migration in 2018. We analyzed impacts of vegetation type around buildings, and window size and surface area ratio to building façade. In contrast to well-known collision hotspots that claim the lives of many birds during migration, Lansing and MSU had a low mortality rate in 2018, with a few buildings causing most of the collisions. This study will provide insight to the public on a topic that is not prioritized in the media. From this we plan to involve the MSU student government and Lansing area building managers to inject change into how the community cares for the ecosystems it interacts with, through mitigation of existing structures and constructing environments less disruptive to the natural behavior patterns of birds.

MORPHOMETRIC COMPARISON OF SPOTTED WING DROSOPHILA OVIPOSITORS FROM VARIOUS HABITATS
Olivia Simaz
Integrative and Organismal Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 427
Mentor(s):

Spotted-wing Drosophila (SWD) (Drosophila suzukii) have become a worldwide key pest of small fruit over the past decade but have been reported as a pest in Japan for over 80 years. SWD's unique saw-like ovipositor, which allows them to compromise healthy, developing fruit is the key to their success as a pest. In this experiment, a morphometric scheme was developed to describe the structure of SWD ovipositors from various populations with the goal of evaluating the phenotypic variation of this unique structure. The initial morphometric schemes were developed using 60

ovipositors collected from a lab colony. Phenotypic plasticity of ovipositors was evaluated using adult flies collected from traps and fruit from 6 unique sites in Michigan between July and September of 2018. This research suggests the limits of this important pest's potential to adapt to thicker skinned fruits.

PARAMETERIZATION OF A HYPOTHALAMUS-PITUITARY-GONADAL-AXIS MODEL FOR LAKE TROUT (SALVELINUS NAMAYCUSH) TO ASSESS THE EFFECTS OF SEA LAMPREY (PETROMYZON MARINUS) PARASITISM ON REPRODUCTIVE PHYSIOLOGY
Noah Dean
Integrative and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 611
Mentor(s): Cheryl Murphy, Tyler Firkus

Mathematical models of biological systems allow us to explore predictions of the effects of external perturbations on an organism's physiology. Reproductive development and function along the hypothalamus-pituitary-gonadal (HPG) axis is a biological system that is highly-sensitive to perturbation. It is therefore important to develop models that allow for assessment of how perturbations to this system are propagated, and the resulting effects on reproductive physiology. In the present study, we take a previously developed rainbow trout (*Onchorynchus mykiss*) HPG model and adapt it to fit lake trout (*Salvelinus namaycush*) in order to assess the potential reproductive effects due to sea lamprey (*Petromyzon marinus*) parasitism. Although lake trout and rainbow trout have similar reproductive physiology that allows the same model framework to be used, the specific parameters and rates differ between the two species. Lake trout parameter values were taken either from the literature, derived from experimental data collected from an ongoing study, or taken from a closely-related species such as rainbow trout or arctic charr when appropriate, and incorporated into the existing model. The resulting model reasonably approximates a lake trout HPG axis and tracks egg size and quality. With the completed model, we can assess predictions of how parasitism from sea lamprey disrupts lake trout reproductive physiology, and link those changes to population-level effects such as egg production or egg quality.

SALT AND GLUCOSE EFFECT ON BLOOD PRESSURE AND BLOOD GLUCOSE LEVELS
Ivan Rakic, Sreekar Malempati
Integrative and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 612
Mentor(s): Erica Wehrwein

Consuming a salty snack or beverage is expected to increase blood pressure and heart rate as the intake of sodium results in water retention by the kidneys while consuming sugary snacks or beverages will increase serum glucose levels. Insulin regulates serum glucose by removing excess glucose into muscular, hepatic, or nephron tissue. We examined the combination effect of the oral solution ingestion comprised of hypertonic salt and glucose amounts. Normotensive and euglycemic subjects of normal BMI (N=8, 4M/3F, ages 19-23) participated in a three part study where each participant consumed three different 20oz. solutions on different days: 0.47M Glucose, 0.15M NaCl, and a combination of 0.47M Glucose with 0.15M NaCl. Before consumption, subjects' baseline heart rate, blood glucose, and mean arterial pressure measurements were taken. After consuming a solution, the same parameters were measured at intervals of 30 minutes, 60 minutes, and 90 minutes. There were no significant differences found in heart rate across any groups. It was found that 30 minutes after intake of the combination solution, the subjects experienced a significant decrease in mean arterial pressure compared to the separate salt and glucose solutions (89±3mmHg vs 94±3mmHg vs 93±2mmHg, respectively $p<0.05$). The combination solution intake produced significantly elevated blood glucose levels compared to both the separate salt and glucose solutions (133±11mg/dL vs 81±1mg/dL vs 106±9mg/dL, respectively, $p<0.05$). Therefore, salt and glucose simultaneous intake may lead to prolonged elevated serum glucose levels, which may be clinically relevant to Type 2 Diabetes Mellitus (T2DM) patients and pre-T2DM patients.

HOW DOES HABITAT FRAGMENTATION IMPACT ABUNDANCE AND RICHNESS OF MUTUALISTIC PLANT-DWELLING MITES?
Carolyn Graham
Integrative and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 613
Mentor(s): Lars Brudvig

Landscape fragmentation poses significant and increasing risk to many species and habitats, leading to species decline and extinction. The impacts of habitat fragmentation on communities are still being uncovered, and species interactions within this context are even less well understood. To further the understanding of these relationships, we studied mites within an artificially fragmented landscape experiment. Specifically, we investigated how patch connectivity, edge-to-area ratio, edge proximity, and number of leaf hair tufts impact mite abundance and species richness of mite communities. To do so, we collected the leaves of Quercus nigra (water oak) trees and examined the undersides of the leaves under dissecting microscope to determine the number of mites and hair tufts per leaf. In addition, mites were collected and sorted into morphospecies. We found a significant interaction between distance from the edges of patches and the type of patch, where there were both more mite individuals and a higher mite species richness at the edges of isolated patches, but not connected patches. There were also both more mite individuals and higher mite species richness on leaves that had more hair tufts. These relationships matched up with our prediction of there being higher mite abundance and richness on the edges of patches where mites are exposed to lower temperatures and shade. The results of this study represent some of the first work on mite communities in the southeast United States, and open the door for future investigations into the species interactions in these communities.

THE ANATOMY OF PESTS
Jason Kazmierczak
Integrative and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 614
Mentor(s): Carl Boehlert, Per Askeland

Many insects, bugs, and arachnids are known to be common pests that harass humanity. Although necessary in the world's ecosystems, mankind will normally do anything in its power to immediately kill or flee from these organisms. However, if humans take the time to observe and study these typical pests, much can be learned from their anatomy. Using a scanning electron microscope, I will look at prepared, metal-coated samples of green shield bugs, spiders, bed bugs, and gnats to observe and take pictures of their microscopic anatomical structures. Then, I will use these pictures and other scientific research to predict and make conclusions as to what visible structures help all of these diverse organisms survive and thrive in their ecosystems.

TAXONOMIC AND TAPHONOMIC EFFECTS ON FOSSIL PRESERVATION IN CONCRETIONS
Josie Anderson
Integrative and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 615
Mentor(s): Danita Brandt

Concretions often form around decaying organic material, but the factors affecting concretion formation are not well-understood. In an attempt to understand concretion formation, Abigail Wolff presented her work on the Pennsylvanian Mazon Fossil Fauna amphibian and fish fossils to UURAF in 2018. The Pennsylvanian-age Mazon Creek fossil fauna of northern Illinois (ca. 300 million-years-old) is famous for exceptional preservation of fossils inside ironstone concretions. Wolff looked for a connection between concretion area and fossil area, but unfortunately, her results were inconclusive. Now, we attempt to look at concretion formation from a different angle using the identity of the fossil organism (taxonomy) and preservation state of the fossil (taphonomy) to explain differences in the ratio of area of concretion to area of the fossil. We used the same specimens from Wolff and applied a new preservation code for the fossils. We found that there is a relationship between taxonomy and the fossil-to-concretion ratio. In general, regarding taphonomy, the fossil-to-concretion ratio is larger with better preservation. However, our sample size is very small (some genera are represented by a single specimen), pointing the way to future work with more specimens and other genera.

STRESS RESPONSES EXHIBITED WHEN POLITICAL IDEOLOGY IS CHALLENGED
Brianna Sholte, Reagan Dehnbostel
Integrative and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 616
Mentor(s): Erica Wehrwein

Increases in heart rate, blood pressure, and glucose levels can indicate physiological stress resulting from integrated biological responses to both physical and emotional stressors. Stressful visual stimuli in particular has been found to create rises in heart rate and blood pressure, indicating that inflammatory images or videos can elicit physiological stress responses. Political propaganda is one common visual and auditory stimulus with which people often report discomfort. We hypothesized that there would be a measurable stress response to visual and auditory political messages being presented that challenged the beliefs held by the participant. Upon exposing participants to political ideology videos opposite to their political inventory scores (developed by The Political Compasstm), changes in heart rate, blood pressure, and glucose levels were measured using a pulse transducer, sphygmomanometer, and a glucose meter respectively. Results indicated a significant increase in heart rate (4.36 BPM, $p<0.001$), systolic blood pressure (11.2 mmHg, $p<0.0001$) blood glucose level (6 mg/dL, $p<0.001$) and self-evaluated STAI (stress survey) scores (14.8% change, ($p<0.0005$). These findings indicated that there was a physiological stress response to political ideology challenge. Furthermore, these results could provide a foundation for future studies that measure the effects of long-term political stress on physical well-being.

FLUCTUATIONS IN JAGUAR POPULATION: AN ANALYSIS WITH CITIZEN SCIENCE
Lauren Caramagno, Chase Smitterberg
Integrative and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 617
Mentor(s): Gerald Urquhart

The Brazilian Pantanal is a wetland area that supports healthy and rising populations of a number of species that have declined elsewhere, including jaguars. Longitudinal data is required to understand these population dynamics through space and time. We initiated a citizen science program to collect baseline and longitudinal animal population data in the region. We questioned whether jaguars temporally displaced pumas in regions with pronounced wet and dry periods. We created checklists, an introductory ecology lesson for school children, and planted camera traps to document a private nature reserve that had not been mapped or surveyed for its biodiversity. Ecotourism is the main economic avenue for many residents, who have vast knowledge of the local species--making the Pantanal an ideal place for citizen participation in data collection. Children have begun documenting species on a yearly field trip, tourists and guides document species and distributions along the Transpantaneira and Cuiabá River, and camera traps have helped assemble a more comprehensive understanding of the species present in the reserve and the flux of their populations. Based on data from camera traps over four years of sporadic collection, we tentatively conclude that jaguars displace pumas in the wet season; this is reflected by increased sightings during wetter areas exploited for tourism. The jaguar population is relevant to regional tourism and conservation. Data produced by our project could support better-informed conservation plans. Citizen science in the Pantanal furthers a continued and self-sustaining ecotourism agenda by involving community members in nature from a young age.

A NEW ONYCHODONT (OSTEICHTHYES, SARCOPTERYGII) RECORD FROM THE MIDDLE DEVONIAN OF MICHIGAN
Lynnea Jackson
Integrative and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 618
Mentor(s): Michael Gottfried, Danita Brandt

Michigan's Devonian fish record consists primarily of placoderm bony armor from several taxa and, more rarely, acanthodian, chondrichthyan, and lungfish remains. We note here a relatively large and well-preserved tooth with distinctive morphology that indicates it belongs to the stem sarcopterygian group Onychodontida, a clade also known from the Devonian of Europe, Australia and China. The specimen was collected in 1998 from a beach in Petoskey, Michigan, and donated to the Michigan State University Museum in 2015. The tooth is preserved in a glacially rounded and fractured limestone cobble that also contains a trilobite pygidium most likely belonging to the genus Greenops, which helps to place the fossil in the Devonian Traverse Group. The recurved tooth, which measures ~3.5cm in overall

length, is exposed in longitudinal cross-section and preserves the complex interlocking structure at the base of the tooth, which, combined with the lack of plicidentine, indicates assignment to the Onychodontida.

GENOMIC CHARACTERIZATION OF AN ECOLOGICALLY IMPORTANT PLANT: COMMON MILKWEED (ASCLEPIAS SYRIACA)
Torel Beard
Integrative and Organismal Biology, Oral Presentation
Section: 4, 1:30 PM, Room 30
Presentation Number: 781
Mentor(s): Mariah Meek, Nadya Mamoozadeh

Common milkweed (*Asclepias syriaca*), a flowering perennial plant widely distributed across central and eastern North America, supports diverse specialist herbivorous insect communities that include the imperiled monarch (*Danaus plexippus*). However, recent shifts in the spatial distribution of common milkweed due to differential land use practices and global climate change are expected to alter the ecological relationships of these plant-herbivore communities. In this study, we examine the genetic attributes of common milkweed in an experimental plot at the University of Michigan Biological Station (UMBS), with a goal of using this system to understand the relationship between genomic variation and species ecology. Specifically, we address the following questions: 1) what is the spatial genetic structure of common milkweed in the UMBS experimental plot, 2) how do neutral and adaptive genetic variation differ among individual plants, and 3) what ecological factors correspond with distinct genomic characteristics. To explore these questions, we employed restriction site-associated DNA sequencing (RADseq) for 192 samples of common milkweed. Resulting RADseq data was used to discover thousands of single nucleotide polymorphisms (SNPs) distributed throughout the common milkweed genome. These SNPs will enable statistically robust assessments of population-level relationships, including the identification of genetically distinct lineages, and genetic variation under the influence of natural selection. RADseq data will also be compared with available ecological information to identify factors influencing genomic variation. This work will provide novel insights into relationships between species ecology and genomic variation, including valuable information on how clonally producing populations maintain adaptive variation.

MORPHOLOGICAL VARIATION IN ROUND GOBY ASSOCIATED WITH NOVEL ENVIRONMENTS IN THEIR INVADED RANGE
Bailey Lorencen
Integrative and Organismal Biology, Oral Presentation
Section: 4, 1:45 PM, Room 30
Presentation Number: 782
Mentor(s): Jared Homola, John Robinson, Kim Scribner

Biological invasions provide useful settings for studying evolutionary processes operating over short time scales. For instance, invasive species may experience strong selection favoring acquisition of local phenotypic adaptations that allow them to become established in their novel environments. The round goby (Neogobius melanostomus) invasion of the Great Lakes basin provides an opportunity to study these processes through analysis of morphological changes in relation to varied ecological conditions. We used geometric morphometrics to analyze of 19 lateral and 8 dorsal anatomical traits using the software TPSDig2. Generalized Procrustes Analysis was used to standardize inter-sample variations associated with characteristics such as size and orientation. Shape variation was then summarized using principal components analysis and subjected to multivariate regression based on Procrustes distances to examine how round goby shapes vary among populations and habitat types (i.e., Great Lakes vs. inland waters). Preliminary results based on 173 individuals from ten populations have identified significant morphological variation based on measured variables. We expect our final analyses of approximately 500 round gobies from 25 populations to reveal further details of adaptive morphological responses potentially associated with water depth, geographical location (e.g., latitude), and environment type. Understanding the capacity of round gobies to adapt to various environments will ultimately improve our ability to predict future species' range expansion and increase the likelihood of implementing successful mitigation and prevention strategies.

GEOMETRIC MORPHOMETRIC ANALYSES OF THREESPINE STICKLEBACK IN A NETWORK OF GEOGRAPHICALLY NOVEL LAKES
Marty Schmidt
Integrative and Organismal Biology, Oral Presentation
Section: 4, 2:00 PM, Room 30
Presentation Number: 783
Mentor(s): Janette Boughman

The classic Darwinian view of evolution presents it as a universally slow and ponderous process. However, recent anthropogenic disturbances have caused environments to begin changing rapidly, and many recent studies have shown that in some circumstances the process of evolution can also occur at a rapid pace. Threespine stickleback (*Gasterosteus aculeatus*), a small marine fish species widely distributed across the upper Northern Hemisphere, is a commonly used model organism for such studies of rapid evolution due to its high phenotypic variability. Here, I investigate the phenotypic adaptation of threespine stickleback to recently colonized freshwater lakes formed by the retreat of Icelandic glaciers. Stickleback invasions from marine to freshwater environments are extremely well-documented, especially in terms of morphology, but the invasion of glacial lakes is as of yet unstudied. Using geometric morphometrics, I quantify and analyze body shape differences of threespine stickleback sampled from 14 Icelandic lakes of varying geologic origins and colonization times. I discuss the morphological differences between these populations, distinguishing known environmental drivers of morphologic change and identifying any selective pressures unique to a glacial lake environment. In addition, since the samples include several populations that colonized separate lakes in parallel, these results explore the repeatability of adaptation to new habitats occurring in the presence of similar selective pressures.

STREAM SYMPTOMS: USING AQUATIC INSECTS AS BIOINDICATORS OF STREAM HEALTH
Noah Lubben
Integrative and Organismal Biology, Oral Presentation
Section: 4, 2:15 PM, Room 30
Presentation Number: 784
Mentor(s): Gerald Urquhart

Insect abundance and diversity are both important indicators of the health of an ecosystem. With issues of climate change and pollution affecting many environments, aquatic insect communities are useful to identify impacts of human activity. Stream health of three West Michigan streams in the Grand River watershed?The Grand River (urban), The Rogue River (rural), and Buck Creek (suburban)?were investigated in this study to determine whether stream health is different in urban, suburban, and rural systems due to human interaction. Stream health was characterized by overall abundance, diversity, and pollution sensitivity of aquatic insects found at each site. It was hypothesized that the urban system would have the lowest overall abundance and diversity, and thus the poorest health because of the high human population introducing the highest amount of pollution. Four testing sites were picked on each water system with similar environments (i.e. bottom substrate and flow rate). Water samples were then tested for phosphates, calcium, and alkalinity. Chemical composition was compared against the diversity indices to determine any correlation. The data displayed significant differences between suburban and urban systems' abundance (P-Value< .05) and between the urban and rural systems along with the suburban and urban System's diversity (P-Value< .05). After, Chemical testing, there was no correlation found between alkalinity and phosphates, however, weak correlation between diversity and calcium concentrations was observed (R^2 =.9227). To conclude, the data did in fact support the hypothesis that the urban system had both the lowest abundance and diversity.

KINESIOLOGY

OBSERVING PHYSICAL ACTIVITY LEVELS IN SPORT PRACTICES FOR YOUNG CHILDREN (<8 YEARS OLD)
Hannah Sitzer
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 386
Mentor(s): Karl Erickson

With sport offering an opportunity for children to be both physically active and social, youth sport programs are popular extracurricular activities for children. However, little is known about sport programs for young children (<8 years old) and whether participants are getting an adequate amount of physical activity during their practice sessions. Previous studies have looked at physical activity levels during practice in older age groups, but research is limited in observing young children. It is important to observe this age group as it is a prime developmental period that may prime future decisions and lifestyle habits. In this study, sport practice sessions of young children will be observed and video-recorded. A coding program, Observational System for Recording Activity in Children: Youth Sports (OSRAC:YS), will be used to measure the participation levels of each child. Preliminary results of this analysis will be presented. These observations will provide a better understanding of the physical activity levels of young children in sport practice settings. With various challenges that may restrict children of this age group from being physically active on their own, providing an adequate amount of physical activity in a practice will give children an opportunity to develop skills that may be used in future healthy lifestyle choices. Further, this study may be sued to inform the development of adequate physical activity levels during sport practices for young children.

SOCIAL COMPETENCE & SELF- REGULATION ABILITY FOR YOUTH (<8 YEARS OLD) IN SPORTS PROGRAMS
Marie Clark
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 387
Mentor(s): Karl Erickson

Early education aims to promote the development of children that are socially and emotionally competent and self-regulating. These qualities are important for children to be able to recognize and manage emotions, make friends, and cooperate with others. Self-regulation is known as the ability to control and manage one's personal thoughts and behaviors. Given these skills young children are learning, it calls the question: Can sports be an avenue to also observe and facilitate these developmental changes? There is a gap in the literature on how children under the age of 8 experience and show social competence in sport settings. To this end, the current study will examine how social competence and self-regulation are demonstrated and co-vary in young children in sports. To measure this, we will use the HTKS (Head, Toes, Knees, Shoulders) assessment associated with self-regulation and inhibitory control. This assessment challenges young children to focus on following difficult instructions and evaluate according body parts promptly in a form of a game and evaluating their responses numerically. We will also assess children's social competence via parent reported survey. Preliminary results on the expression and association between self-regulation and social competence will be presented. Findings of this study will add to the literature for the study of children under 8 in the sports context. The findings could be especially useful to parents and schools in showcasing how youth sports for young children may promote the further development of self-regulation and social competence critical to their successful integration into society.

INTERFERENCE RESULTING FROM THE MANIPULATION OF REFERENCE FRAMES IN A REACHING TASK
Alexandra Janson
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 388
Mentor(s): Florian Kagerer, Phillip Desrochers

During simultaneous bimanual reaches, visuomotor perturbations of one hand can elicit interference in the opposing hand. This causes the unperturbed hand to show increased reaching error. However, dynamic force-field perturbations do not show interference. These perturbations have been shown to affect neural reference frames, the means by which the nervous system represents spatial relationships between the body and the environment differently for each type of perturbation. The objective of this experiment is to assess if manipulating the reference frames during a dynamic perturbation will cause interference to increase. Two groups of young adult participants will perform a reaching task

while their movements are measured on a robotic device. Visual feedback of hand position will be represented by cursors on a screen. A 20 Nsm^{-1} horizontal dynamic perturbation will be applied to the right hand that is proportional to the vertical velocity. For the first group, two cursors will represent the right and left hand, allowing independent planning of movement. For the second group, a single cursor will represent movement of the right and left hand together, causing the movement to be jointly planned in the nervous system. We will evaluate left-hand interference between the two groups. If making a dynamic task more intrinsic and head-centered generates more interference, then interference from the shared cursor task will be greater. The results from this experiment will provide more information on how manipulating reference frames changes interference, and a greater understanding for how hands communicate during movement.

ARE TWO HANDS BETTER THAN ONE WHEN LEARNING TO CONTROL VARIABILITY IN PRECISION MOVEMENT TASKS?
Madeleine Motloch, Emma Schuele, Megan Miller
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 389
Mentor(s): Rajiv Ranganathan

In our daily life we perform numerous tasks using both hands. Such two handed tasks require coordination between the hands to successfully complete the task. However, some of these two handed tasks like casting a fishing rod could also be completed with just one hand. Why would one want to use two hands when the task can be completed with just one? In our study, we examine if performing a task with two hands offers greater learning and performance advantages than performing the same task with one hand. We designed a precision task where the participants traced a 'W-shaped' track using a cursor as fast as possible while maintaining the cursor within the width of the track. Participants were divided into two groups depending on how they controlled the cursor - the unimanual group had the cursor positioned at the location of the dominant hand and controlled the cursor with the dominant hand, whereas the bimanual group had the cursor positioned at the average position of the two hands and controlled the cursor with both hands. In this case, the bimanual task increases the complexity due to coordination requirements between the hands, but at the same time it allows for correction of movement errors (i.e. one hand can correct for errors made by the other). Thus, we hypothesize that even though using two hands might seem wasteful, it will lead to enhanced learning of the task in comparison to using just one hand.

TRANSFER OF STRUCTURAL LEARNING ACROSS EFFECTORS
Jessica Cummings, Carolyn Springer, Aubrey Haughn
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 390
Mentor(s): Alexander Brunfeldt, Florian Kagerer

Structural learning is a type of implicit learning in which the underlying structure of a task is learned as opposed to the specific parameters. Previous studies have shown that "training" a limb with random visuomotor perturbations increases adaptation rates in that limb during a "test" period with a fixed perturbation. The purpose of this study is to determine if learning a structure in one limb can transfer to the contralateral limb. If transfer is observed, this could support the development of new rehabilitation techniques for patients with movement disorders affecting one limb, a common side effect in stroke patients. Right handed participants will perform a unimanual center-out reaching task on a KINARM endpoint robot. Participants will control a cursor displayed on a screen occluding their hands. The control group will experience no visual cursor rotation during the training phase while the test group will receive random rotations ranging from +90 to -90 degrees about the target positions. After training, the participants will complete reaching trials in the left hand with a fixed -60 degree visual rotation. Initial directional error, the angular deviation from a straight movement path, will be calculated to determine the rate of adaptation in the left hand. If structural learning generalizes across effectors, then adaptation rate will increase in the contralateral limb of participants who engaged in structural learning compared to those who did not. This study could help us better understand movement and learning which could lead to better rehabilitation options for patients exhibiting movement disorders.

TOO EASY, TOO HARD OR JUST RIGHT: USING ADAPTIVE PRACTICE TO OPTIMIZE MOTOR LEARNING
Logan Ben-Ezra, Jaret Allred
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 391
Mentor(s): Mei Hua Lee, Priya Patel

When learning a new motor skill, it is often debated whether facing a challenge is advantageous to learning - for example, learning to shoot a basketball in a guarded vs. unguarded situation. In order for such challenges to facilitate motor skill learning, they should be tailored to the learner's ability. Adaptive practice schedules that include repetitions of low-performing tasks/trials can help to impose such challenge in motor learning. However, a limitation to these practice schedules could be that the learner does not learn all tasks or trials available, receiving training only on the more difficult ones. Therefore, the aim of this study is to investigate different frequencies of adaptive practice, and which frequency optimizes motor learning in the presence of learner-driven difficulty. For this purpose, a customized body machine interface (BoMI) was used to develop a virtual reaching task in which participants reached for target circles on computer screen using body movements. Three different groups of college aged adults learned this task through 160 practice trials using different frequencies of adaptive practice sessions 100%, 75% and 50%. In adaptive practice sessions, targets were repeated after high error to produce a more challenging session, while in remaining sessions all the targets were presented in random order. We expect that the group with 50% adaptive practice sessions will outperform other groups in terms of performance and learning of this novel task. Results from this study may help in rehabilitation interventions that use learner-adapted strategies.

IDENTIFICATION OF SPATIOTEMPORAL CLUSTERS ON THE PRESCHOOL SCHOOLYARD
Emily Hughes
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 392
Mentor(s): Kimberly Clevenger, Karin Pfeiffer

While the importance of outdoor time for providing young children with opportunities for physical activity and learning is well accepted, there is little research on where preschoolers play during provided outdoor time. Methods for measuring where children spend time could be used in assessing schoolyard interventions (e.g., redesign), in research on group (e.g., sex) differences in behavior during outdoor time, and for better understanding children's exposure to different settings. The purpose of this study was to demonstrate the use of a spatiotemporal clustering algorithm for identifying locations where children spend time on the schoolyard. Preschoolers (n=49) from 5 schools wore a QStarz BT-Q1300-ST Global Positioning Systems tracker on their right hip during school outdoor time for 1-3 days. Location on the playground was recorded every 1- to 5-seconds. The GPS Activity Spaces Destinations (GPSAS) software, an open-source Visual Studio C# program that is available on GitHub, was used to identify spatiotemporal clusters of points that met spatial (within 3 meters of each other) and temporal (within a 10-minute time period, at least 3 minutes in duration) parameters. Spatiotemporal clusters were identified in every school, but approximately 25% of children did not have clusters. Further, location of spatiotemporal clusters was not uniform for every participant. This study demonstrates that the GPSAS program can identify spatiotemporal clustering in this setting and could be used in future research. Combination of GPS with other monitors, like accelerometers, may provide additional information on children's schoolyard behavior.

INVESTIGATING GAZE DURING BIMANUAL REACHING
Akshay Seenivasan, Kate Cavataio
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 393
Mentor(s): Florian Kagerer

Previous research has shown that while performing reaching tasks, humans tend to seek visual information of the target during the movement in order to execute the reach accurately and efficiently. For example, during a unimanual reaching task in which the left hand moves towards a target which moves either to the left or to the right during the movement, gaze tends to saccade in the direction of the movement of the target. During a bimanual reaching task in which each hand controls the movement of a cursor to two different targets, however, gaze duration and focus must be divided between the two targets because gaze can only be directed at a single target at any given instant. We are interested in how gaze patterns vary across conditions with differing target placements during a bimanual reaching task. Using a

double joystick apparatus linked to a monitor showing two cursors representing hand position and target positions and an eye tracker, we will investigate gaze during simultaneous hand movements. In two conditions, the hands will move to targets either isodirectionally or in a mirror fashion. Based on the endpoint control strength of the nondominant hand, we predict that gaze will shift more to the dominant hand towards the end of the movement.

OBSERVATION OF INFANT POSITIONING IN CHILDCARE CENTERS
Olivia Wasilenski
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 457
Mentor(s): Janet Hauck, Yuemei Lu

Tummy time is the deliberate placement of an infant in prone position while awake. Tummy time is a developmentally beneficial position that facilitates improved motor skill development and increased physical activity. Unfortunately tummy time is often underutilized. It is suspected that infant positioning devices, which restrict movement capability, are used more frequently as a result. Infants spend a majority of their day in childcare, making childcare centers the ideal location to increase tummy time behavior and decrease infant positioning device use. However, we need to first observe how infants are typically positioned in this setting. Therefore, this study seeks to quantify the time infants spend in tummy time and in infant positioning devices during a typical day in center based childcare. Methods: Infants were observed in real time while at childcare. A trained observer logged the frequency and duration of use of infant positioning devices, tummy time, floor time, and time being help by caregivers. Data was summarized using means and standard deviations. These results will contribute to our knowledge of how motor development and physical activity are supported in childcare facilities. These results can assist us in promoting physical activity routines in these facilities to enhance infant motor development.

EXAMINING COACH-CHILD INTERACTIONS IN YOUNG CHILDREN'S SPORT: AN OBSERVATIONAL STUDY
Maddie Helm
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 458
Mentor(s): Karl Erickson

Previous research has explored the implications of coach-athlete relationships on adolescent development. However, research with young children (<8 years old) is overlooked and under researched. It is important to conduct further research on coach interactions when dealing with young children's involvement in sport as they hold unique developmental differences. Considering the gap in literature, this study is designed to examine the interpersonal behaviours between coaches and athletes that are under 8 years old. With this age group, coaches are often volunteers, have minimal background and untrained in early care and education (ECE). ECE strategies are being used in education and health care provider settings, but little is known about how it can be applied to coaches to support the satisfaction of the child's experience. With the influential role coaches play, it is important for coaches to be well equipped to understand their influence when working with young children. This study will observe coach-athlete interactions in order to explore coach behaviors influence on a young athlete's behavior and satisfaction of their sport experience. In data collection, the coach-athlete interactions will be recorded and analyzed using a temporal coding system. A developmentally-appropriate child satisfaction questionnaire will assess young children's satisfaction with their sport experience. Preliminary results will be presented. The results of this study will lead to a greater understanding of the influence coach behaviours have on young children's sport experience. Future directions of this line of research include assessing how ECE guidelines can be incorporated into young children's sport environment.

MITOCHONDRIAL CONTENT IN SKELETAL MUSCLE FOLLOWING POSTNATAL UNDERNUTRITION IN MICE
Cole Orlikowski, Summer Stefanko, Mark Cosio
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 459
Mentor(s): David Ferguson

It is hypothesized that muscle loss caused by postnatal undernutrition is associated with mitochondrial dysfunction. Therefore, the purpose of this study was to evaluate mitochondrial content, through quantification of succinate dehydrogenase (SDH) in control and postnatally undernourished skeletal muscle in mice. Postnatal undernutrition (PUN) was achieved using a cross fostering model. After birth, pups were undernourished by feeding the dams a low protein

diet (LP). LP dams produce ~15-20% less milk, therefore any pups suckling will be growth restricted. Once pups reached 21 days of age (PN21), they were weaned to the control diet. At PN80, the mice were euthanized and the soleus muscle was removed from control (CON, N=3) and PUN (N=3) groups. Cross sections of the soleus were cut in 5 μm section and stained for SDH. Muscles were imaged using a Nikon C2 confocal microscope and SDH content in the cells were quantified through manual counting. On average, 333 cells per group were counted. Differences in mitochondrial content between PUN and CON with regards to sex was evaluated via ANOVA ($p<0.05$) using JMP statistical software. Results indicated that PUN had 32.51 ± 6.09% higher ($p<0.05$) SDH expression compared to CON in soleus muscle cells. This may indicate that PUN group relied more on aerobic respiration in lieu of glycolysis for chemical energy generation in their soleus muscle. Further research should be conducted to test if this is a compensatory mechanism for lack of muscle mass and/or mitochondrial dysfunction.

THE EFFECT OF GEOGRAPHICAL LOCATION AND FORMER CONCUSSION EDUCATION ON PARENTS' KNOWLEDGE AND PERCEPTION OF SPORTS RELATED CONCUSSIONS IN YOUTH ATHLETES

Joel Erickson, Devon Topp
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 460
Mentor(s): Abby Bretzin, Tracey Covassin

Medical coverage for youth sports is limited, leaving parents responsible for recognizing and seeking medical evaluation for sport-related concussions (SRC). Little is known about the knowledge and perceptions of SRCs among the parents of youth athletes. The purpose of this study is to assess SRC knowledge and perceptions of parents of youth athletes and assess differences between geographic location (Pennsylvania, n=240; Michigan, n=142) and those with (n=140) and without (n=238) former SRC education. Parents of youth athletes (football, lacrosse, soccer, or ice hockey) completed two previously validated surveys, a 48-item SRC knowledge questionnaire, and a 26-item Concussion Perceptions Questionnaire (CPQ) scored from 1 ("strongly disagree") to 5 ("strongly agree"). Participants completed demographics, recognition of SRC signs and symptoms, general SRC knowledge, and perceptions of SRCs. Separate one-way ANOVA's were used to evaluate differences in parents' SRC knowledge and CPQ between geographic location and former SRC education. Significance was set a priori at $p<.05$. Overall, parents' knowledge scores were 40.87±4.3, and CPQ scores were 93.09±8.2. There were significant differences in knowledge scores between parents in Pennsylvania (41.25±4.4) and Michigan (40.26±4.0; $F(380)=4.866$, $p=.028$). There were no significant differences in CPQ scores between geographic location ($F(380)=.086$, $p=.770$), and no significant differences in knowledge ($F(376)=1.704$, $p=.193$) or CPQ ($F(376)=.292$, $p=.589$) scores between parents with and without former SRC education. These findings suggest future research should investigate why differences in geographical location influence SRC knowledge.

COMPARING OVERALL SLEEP QUALITY IN CONCUSSED AND NON-CONCUSSED COLLEGIATE AND HIGH SCHOOL ATHLETES ACROSS RECOVERY

Kelsey Macdonald, Taylor Davis
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 461
Mentor(s): Morgan Anderson, Tracey Covassin

Following sports-related concussion (SRC), collegiate and high school athletes experience a variety of symptoms, neurocognitive, vestibular and balance impairments. However, few studies have examined how SRC affects overall sleep quality. The purpose was to compare maladaptive sleep quality between concussed and non-concussed collegiate and high school athletes throughout SRC recovery. All athletes completed the Pittsburgh Sleep Quality Index (PSQI) at three time points across recovery (> 72 hours, return to play (RTP), 45 days after RTP). A one-way repeated measures analysis of variance (ANOVA) was used to compare overall sleep quality between concussed and non-concussed athletes across SRC recovery. The independent variables were time since onset of SRC, and group (concussed, non-concussed athletes). The dependent variable was overall sleep quality. The final sample included 32 concussed (17 college,15 high school) and 21 non-concussed athletes (9 college,12 high school). There were no significant interaction for time and group. However, a significant within subjects effect for time (Wilks ? = 0.73, $F_{(2, 51)} = 9.28$, p ? .001, $?^2 = .27$) was observed. In addition, a significant between subjects effect for group was revealed, specifically concussed athletes had significantly higher PSQI scores (5.3 ± 0.4) than non-concussed athletes (3.79 ± 0.44) ($p = .009$). Given the results of this study, it could be important to continue to investigate overall sleep quality after SRC given that poor sleep quality may lead to maladaptive patterns in behavior. In addition, future research should establish how sleep quality affects recovery time.

AEROBIC FITNESS AND ARITHMETIC APPROXIMATION IN COLLEGE-AGED ADULTS
Kate Voisard
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 462
Mentor(s): Matthew Pontifex

Evidence demonstrates that aerobic fitness is associated with improved math scores on standardized achievement tests. Such assessments provide only a broad assessment of mathematical cognition, failing to capture the extent to which aerobic fitness relates to particular domains of arithmetic processing. Accordingly, the present investigation examined fitness-related differences in behavioral and pupillometric indices of approximate arithmetic processing. Undergraduate students were separated into higher and lower aerobically-fit groups based upon maximal oxygen consumption (VO2max). Pupil size was recorded while participants performed an arithmetic task presenting operands a + b in which participants were instructed to use approximation to indicate whether the problem sums were greater than or less than 100. Problems were equally distributed across small-split (i.e., ± 2 or 5%; 67 + 38), large-split (i.e., ± 10 or 15%; 42 + 73), and massive-split (i.e., ± 50 or 55%; 17 + 28) conditions. Smaller split size was associated with slower reaction time, decreased response accuracy, and greater pupillary reactivity. However, no effects of fitness were observed. These findings suggest that aerobic fitness appears unrelated to behavioral and pupillometric indices of arithmetic approximation processing.

SEX DIFFERENCES IN NUTRITION KNOWLEDGE OF DIVISION I COLLEGE ATHLETES
Alyssa Guadagni
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 463
Mentor(s): James Pivarnik, Emily Werner

Appropriate nutrition is imperative for participation in, and recovery from, exercise. However, many college athletes have insufficient nutrition knowledge to help them stay healthy for sports. The purpose of this study was to assess nutrition knowledge of NCAA Division I college athletes using a validated nutrition knowledge survey. Subjects were Division I varsity athletes. A validated nutrition knowledge survey was administered at different settings convenient to the athletes. Participants were asked not to share answers or use outside resources. Scores were summed as +1 for a correct answer or +0 for no answer, an incorrect answer, a double-answer, or "I don't know". Maximum possible score was 97. Knowledge was categorized as low (<33rd percentile), medium (33rd to 66th percentile), and high (> 66th percentile). Knowledge category frequencies were tallied, and an independent t-test was run to determine sex differences. Alpha level was set at $p<0.05$. Athletes (n=128; n=70 female) from eight different sports completed the nutrition knowledge survey. Each knowledge category frequencies were 42 (n=11 female) with low, 24 (n= 7 female) with medium, and 62 (n=52 female) with high knowledge. Average scores for females were 64.5±15.9, 43.1±11.0, and 21.4±5.9 for total survey, general nutrition, and sport nutrition sections, respectively. On average, males scored significantly lower, with scores of 43.6±15.1, 27.6±10.1, and 16.0±6.7 for the same sections ($p<0.001$). Based on survey results, most NCAA Division I athletes assessed fell into the high nutrition knowledge category, particularly females. Future research should assess knowledge of specific nutrition concepts.

VISUOMOTOR PERTURBATION PLAYS A GREATER ROLE THAN DYNAMIC PERTURBATION DURING A BIMANUAL INTERFERENCE TASK
Kayley Irwin
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 526
Mentor(s): Florian Kagerer, Phillip Desrochers

During complex bimanual movements, the action of one hand can influence the action of the other hand in a process called interference. Interference can be probed using a visuomotor perturbation in the right hand and observing changes in left-hand movement. Interestingly, studies have shown that when participants instead experience a force perturbation, they exhibit limited interference between hands. However, unimanual studies have demonstrated that simultaneous visuomotor and force perturbations show a synergistic motor response. The objective of the study is to explore whether simultaneous exposure to both visuomotor and force perturbations has a synergistic effect on interference between the hands. Participants will be randomly assigned to one of four groups: no perturbation, force perturbation only, visuomotor perturbation only, or simultaneous force and visuomotor perturbation. Participants will

reach toward different targets using a robot. During visuomotor perturbation, a cursor representing the right hand will be rotated 40 degrees, such that participants must alter their right-hand movement trajectory to hit a target with the cursor. During the force perturbation, the participants will encounter a force perpendicular to their movement that is proportional to their reaching velocity. The dual-perturbation group will be exposed to both perturbations simultaneously. Interference will be assessed in the left, non-perturbed hand by evaluating reaching error. Preliminary results show there is no significant difference in interference between visuomotor and dual-perturbation groups, though both the visuomotor and dual-perturbation groups showed greater interference than controls. This suggests visual feedback plays a greater role in bimanual movement than dynamic feedback.

DO AGE DIFFERENCES PLAY A ROLE IN THE ABILITY TO ADAPT TO NOVEL MOTOR TASKS?
Autumn Bennett, Stephanie Tran
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 527
Mentor(s): Priya Patel, Mei Hua Lee, Sachin Devnathan Narayanan

The ability to adapt is an essential skill as people encounter disturbances or sudden unexpected changes (also termed as perturbations) while performing motor tasks in daily routines. For example, adaptation is required when walking or riding a bike on icy ground in order to prevent falls. While people have such an ability to adapt, age-related differences exist in the rate of adaptation while performing motor tasks. However, these studies lack in using a novel motor task which is required to eliminate confounding factors such as prior experience and differences such as body scale, height, and age. Therefore, the purpose of this study is to assess adaptation to visual perturbations in a virtual reaching task (novel motor task) in children and adults. A customized body-machine interface (BoMI) was used to develop the virtual reaching task wherein participants used upper body movements to move a cursor to different targets on the screen. Participants in both the age groups were first trained using 120 practice trials of the task, followed by 120 perturbation trials (cursor position showed 45º visual rotation) and testing on original task without cursor position perturbation at the end. Performance is expected to decrease initially on introduction to perturbation, followed by gradual adaptation and high after effects in adults as compared to children. This study results may contribute to understanding age-related adaptation differences in motor tasks.

DOES SELF-CONTROLLED PRACTICE HELP OLDER ADULTS LEARN A NOVEL MOTOR TASK?
Timothy Havern, Jenna Borchanian
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 528
Mentor(s): Mei Hua Lee, Priya Patel, Amy Francesca Bellito

Although there is an increase in experience with increasing age, older adults generally take longer than young adults to learn a new motor skill. While several reasons including cognitive decline and physical limitations may contribute to learning differences, the type of practice schedule used is an important reason to consider. Given several practice schedules such as random practice, experimenter-imposed practice, self-selected practice etc., the latter may facilitate learning in elderly population since it is learner driven. Therefore, this study aimed to investigate if a self-selected practice schedule can aid elderly people to learn a novel motor task similar to adults. In self-selected practice, a participant decides the order of completing assigned tasks. For this, a virtual reaching task using customized body machine interface (BoMI) was used in which participants use their body movements to move a cursor to different targets on screen. Participants in three age groups: young adults (18-25years), middle (30-50years) and older (51-75years) were trained for this task using 160 practice targets and tested for 72 targets. For the middle and older groups, self-selected practice schedules were used where participants chose the order of practicing different targets. Adults group was trained using random practice schedule where participants had no control over the order of targets. Results indicate elderly and middle age groups performed similar to young adults in terms of their motor performance. This finding supports the idea that when self-selected practice is utilized, middle-aged and older adults can perform as well when compared to younger adults.

AEROBIC FITNESS AND BODY COMPOSITION OF WOMEN WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION
Jane Groetsch, Brett Oliver
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 529
Mentor(s): Ashley Triplett, Christopher Kuenze

Anterior cruciate ligament reconstruction (ACLR) requires 6-to-9 months of rehabilitation, often resulting in long periods of sedentary behavior. Following rehabilitation, only 45% of patients fully return to pre-injury level of sport participation, placing them at elevated risk of developing a physically inactive lifestyle. It is unknown whether ACLR negatively impacts aerobic fitness and body composition in the months following surgery. The purpose of this study was to compare body composition and aerobic fitness between women with ACLR and healthy controls. Nine women with ACLR (<5yrs post-ACLR, age=21.2±3.9yrs) and seven healthy women (age=22.4±3.7yrs) with no injury history completed the Tegner Activity Scale to assess current physical activity level. Body fat percentage (%BF) was estimated using air displacement plethysmography. A graded exercise test using a cycle was performed by all participants to evaluate aerobic fitness (VO_{2peak}), defined as the highest 20sec VO_2 attained during the test. Variables were compared between groups using Mann-Whitney U tests due to limited sample size. Individuals with a history of ACLR had significantly higher %BF (ACLR=33.5±6.5%, healthy=24.4±5.2%) (p=0.01). No differences were observed in absolute VO_{2peak} (ACLR=2.4±0.3L/min, healthy=2.5±0.3L/min) (p=0.61). Women with a history of ACLR may have greater %BF than women who have not experienced a knee injury. No significant difference was found in aerobic fitness between the groups as absolute VO_{2peak} is evaluated in cycle protocols. Excessive %BF and low aerobic fitness are risk factors for chronic disease and premature mortality; therefore, it is concerning that these women returning to activity post-ACLR have poorer %BF than healthy women.

INFANT AFFECT DURING TUMMY TIME
Anna Bradley, Julia Jaske
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 530
Mentor(s): Janet Hauck, Yuemei Lu

Tummy time, the placement of an infant in the prone position for a certain period of time, is an important routine for caregivers to implement because it allows infants to build the postural muscles that are needed during motor development. In order for tummy time sessions to be effective, it is important to understand what environmental factors influence infant behavior while in tummy time. The purpose of this study is to understand how different factors, such as caregiver proximity, toy availability, and tummy time surface influence infant affect while in the prone position. Videos will be coded by a trained observer and infant responses will be summarized as a percentage of time of a bout of tummy time within each environmental characteristic category. The results of this study are expected to help us understand what environmental characteristics infants respond to so that caregivers can better implement tummy time.

GENDER DIFFERENCES IN PSYCHOLOGICAL OUTCOMES BEFORE RETURN TO PLAY FROM ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION
Megan Chan, Jessica Ling
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 531
Mentor(s): Justin Disanti, Caroline Lisee, Karl Erickson

Previous literature with anterior cruciate ligament reconstruction (ACLR) has identified psychological barriers to recovery in individuals with a history of ACLR. Female adolescents demonstrate poorer physical outcomes compared to male adolescents, but it is unclear if gender deficits also exist in psychological barriers. The purpose of this study was to explore gender differences in psychological barriers in how high school athletes recovered during the rehabilitation following ACLR. Twenty-five total participants (13 males,12 females, age=16.2±1.3 years, times since surgery=6.0±1.2 months) who had not been cleared to return to activity were subjected to a qualitative semi-structured interview process. Each participant was asked a series of questions about their views on physical activity, the process of how they dealt with the injury, and any thoughts they had along the way. Key themes that were similar across gender and differentiated between male and female participants were identified. The results help medical professionals in how to approach gender based psychological interventions during rehabilitation.

THE EFFECT OF LEG COMPRESSION ON LOWER NEGATIVE BODY PRESSURE (LBNP) TOLERANCE IN FEMALES
Renell Shisha
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 532
Mentor(s): David Ferguson

Automobile racing drivers that compete on banked ovals (Daytona, Indianapolis) are exposed to vertical gravitational (Gz) forces, which can cause blood pooling in the legs, and hinder driver performance. Researchers have used lower body negative pressure (LBNP) tolerance to evaluate racing driver's Gz force tolerance, whereby participants lay in the LBNP chamber in athletic clothing until maximal Gz tolerance is achieved. There has been a surge in female racing drivers who wear compressive leggings as athletic clothing. The purpose is to determine if compressive leggings worn during LBNP exposure increases Gz tolerance in females. All females (N=5) partook in three separate LBNP tests that consisted of loose shorts (control), regular leggings, and compression-based leggings. Participants were sealed at the waist in the LBNP chamber, where the internal pressure was decreased by 10mmHg every 3 minutes to stimulate Gz loading. Heart rate (HR) and blood pressure (BP) were consistently recorded during each session, during maximal Gz exposure. There was a significant difference in the average diastolic arterial pressure (DAP) of compression in comparison to the control (compression 116.4 ± 11.3 mmHg; control 105.2 ± 18.7 mmHg; $P<0.05$). However, there was no significant difference when comparing the control to regular leggings (106.8 ± 6.7 mmHg). These findings suggest that compression-based leggings increase Gz tolerance and potentially skew existing data regarding female racing drivers evaluated by LBNP.

THE RELATIONSHIP BETWEEN QUADRICEPS STRENGTH CHARACTERISTICS AND SAGITTAL PLANE KNEE KINEMATICS AND KINETICS IN MEN AND WOMEN WITH ACLR
Tess Mcguire
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 533
Mentor(s): Christopher Kuenze, Caroline Lisee, Tom Birchmeier

Quadriceps strength characteristics are consistently impaired for years after anterior cruciate ligament reconstruction (ACLR); however, these impairments are most severe among women. Quadriceps dysfunction has negative effects on high-risk landing movement patterns which expose individuals to increase risk of re-injury. The purpose of this observational study was to assess the relationship between quadriceps strength characteristics, peak knee flexion angle, and peak knee extension moment during a single leg drop vertical jump (SLV) in men and women after ACLR. Seventeen men (age=22.29±16.22 years, time since surgery=40.0±27.16 mo) and 35 women (age=22.71±4.68 years, time since surgery=36.71±22.29 mo) with unilateral ACLR participated. Knee kinematics and kinetics were assessed via 3D motion capture while each participant completed an SLV off a 30 cm box. Participants also completed isometric knee extension strength assessment on a dynamometer. Mass normalized peak knee extension torque and rate of torque development (RTD_{100} and RTD_{200}), which examine the change in force over time during different period of time during the torque-time curve, were measured. The relationship between RTD outcomes and peak knee flexion and extension moment were evaluated using partial correlations ($?^2$) in both men and women. For men, there were significant, positive relationships between RTD_{200} and knee extension moment ($?^2$=0.52, p=0.034), as well as between peak torque and peak knee flexion ($?^2$=0.53, p=0.03). For females, there were positive relationships between all quadriceps characteristics and both knee flexion angle and extension moment ($?^2$=0.47-.067, $?^2$=0.001-0.01). Targeting gender specific quadriceps strength characteristics after ACLR may help reduce high-risk movement in hopes for safer recovery and return to play.

EXAMINING SPORT-RELATED CONCUSSION SYMPTOM CLUSTERS FOR THE SPORT CONCUSSION ASSESSMENT TOOL
Anna Metter, Caroline Szabo
Kinesiology, Oral Presentation
Section: 4, 8:30 AM, Lake Superior Room
Presentation Number: 791
Mentor(s): Kyle Petit, Chris Tomczyk, Tracey Covassin

The increasing prevalence and negative effects of sport-related concussions (SRC) have allowed for an increase in research evaluating post-concussion clinical symptoms. Specifically, previous research has utilized symptom factor analysis, or groupings of associated symptoms to better guide clinical treatment (i.e. vestibular therapy). However, factor structures for sideline assessment tools such as the Sport Concussion Assessment Tool (SCAT) have yet to be determined. The purpose of this study was to explore the factor structure for the graded symptom checklist (GSC)

within the SCAT. The GSC is a 22-item checklist where athletes grade the severity of symptoms on a 0-6 Likert style scale. The GSC was completed at baseline (pre-season) and following SRC diagnosis (within 72 hours). An exploratory factor analysis (EFA) yielded three different symptom factor clusters at baseline and post-concussion. A total of 1334 healthy (52.1% male) and 200 concussed (66.0% male) high school and collegiate athletes completed the GSC on the SCAT. At baseline, the clusters consisted of cognitive (34.2% variance, 8 symptoms), migraine (7.8% variance, 6 symptoms), and affective (6.2% variance, 5 symptoms). Post-concussion factors include migraine-fatigue (40.4% variance, 9 symptoms), affective (7.9% variance, 6 symptoms), and cognitive-vestibular-ocular (6.72% variance, 6 symptoms). Medical professionals can use the information gathered from this assessment to provide targeted treatment procedures early in the recovery process. Future research should focus on examining SRC recovery trajectories in athletes presenting with these various symptom factors.

EFFECTS OF A BIMANUAL INTERFERENCE TASK ON EEG BRAIN DYNAMICS
Bradley Miller
Kinesiology, Oral Presentation
Section: 4, 8:45 AM, Lake Superior Room
Presentation Number: 792
Mentor(s): Florian Kagerer , Phillip Desrochers , Alexander Brunfeldt

In bimanual movements, interference can occur when the motion of one hand influences the action of the other, particularly if the two hands are performing complicated, asymmetrical actions. Interference may be the result of increased neural crosstalk between brain regions, but the neurophysiological changes that occur during interference remain largely unexplored. Coherence is an electroencephalographic (EEG) measure of functional connectivity and is representative of communication between brain regions, whereas spectral power is a measure of the engagement of a brain region during a motor task. If interference is a result of increased neural crosstalk, then inducing interference should change spectral power and coherence. To test this hypothesis, a group of participants performed a bimanual center-out reaching task on a KINARM endpoint robot while EEG was recorded. Participants controlled two cursors, each representing one hand's position, on a screen that obstructed their view of their hands. After a baseline period, participants experienced a visuomotor rotation in which the right hand's visual feedback was rotated 40 degrees. The left hand's visual feedback was removed, leaving the left hand susceptible to interference from the perturbed right hand. To assess interference, reaching error in the left-hand was compared to a group of control participants who did not receive a right-hand perturbation. The results support our hypothesis, showing changes primarily in beta frequency power and coherence throughout the adaptation. Exploring these neural mechanisms of interference provides a better understanding of complex bimanual coordination.

ACUTE PERCEPTUAL RESPONSES TO CIRCUIT AND SPRINT HIGH-INTENSITY INTERVAL EXERCISE IN CHILDREN
Emily Kryska, Rami Stanbouly
Kinesiology, Oral Presentation
Section: 4, 9:00 AM, Lake Superior Room
Presentation Number: 793
Mentor(s): Karin Pfeiffer

High-intensity interval exercise (HIIE) involves intense, short bouts of near-maximal exercise interspersed with recovery periods. Acute perceptual responses to various HIIE protocols in children are poorly understood. The purpose of this study was to compare changes in rating of perceived exertion (RPE), affect, and enjoyment between body-weight circuit and treadmill-based sprint HIIE in children. Active boys (N=17; age = 9.7±1.3 years) completed baseline, trait-based affect and exercise enjoyment surveys followed by an exercise test. On two subsequent occasions, participants completed a time-matched (8-minute; 30s work: 30s recovery) body-weight circuit and treadmill sprint protocol. RPE, affect, and enjoyment were recorded at pre-exercise, 38% and 75% of session completion, and post-exercise. Trait-based affect and enjoyment surveys were completed 10-minutes post-exercise. Peak RPE was equal to 5.1±2.2 and 5.7±1.8 in response to body-weight and sprint HIIE, respectively, and was not different between protocols ($p=0.7101$). Affect remained positive during and post-exercise for body-weight (3.4±1.3) and sprint (3.4±1.5) and did not differ between protocols ($p>0.05$). No change was evident ($p>0.05$) for trait affect from baseline to post-exercise. Exercise enjoyment responses did not differ between protocols during exercise ($p>0.05$), but trait enjoyment was significantly lower after body-weight compared to baseline (mean difference = 3.9±4.7, $p=0.011$, ES=0.48). Neither body-weight or sprint HIIE elicited unpleasant feelings, similar to previous findings. Given that affect and enjoyment are strong predictors of exercise adherence, future research should compare acute perceptual responses to HIIE in girls within various contexts to examine sex differences in exercise responses.

LEARNING BY OBSERVATION: IS IT IMPORTANT TO WATCH MULTIPLE WAYS TO SOLVE A TASK?
Tucker Alchin
Kinesiology, Oral Presentation
Section: 4, 9:15 AM, Lake Superior Room
Presentation Number: 794
Mentor(s): Rajiv Ranganathan

In sports, watching an expert is a common form of practice: the learner replicates the expert's movements to achieve the desired outcome (goal). This concept is known as observational learning and is helpful when verbal or physical prompting does not provide enough useful information about desired movements for the learner. However, because of motor redundancy, (i.e., the ability of the body to recruit different limbs, muscles, and joints), experts have multiple movement patterns that they can use to reach the same goal. For example, in tennis, Roger Federer does not have a 'single' forehand movement pattern but a variety of different forehand movement patterns that can all generate the same successful outcome. In this scenario, what facilitates observational learning - watching a single successful movement pattern or watching variations of successful movement patterns? We addressed this question by creating a novel task that has multiple ways to achieve the goal. Half of the participants viewed a video of an expert performing a single movement, whereas the other half viewed multiple videos of an expert performing different movements of doing the same task (but all of which were successful). Our prediction is that learners that view multiple videos that display a variety of solutions, will have greater improvements in task performance. The results will be useful in sports training, and in physical rehabilitation of individuals with motor impairments.

AN EXAMINATION OF PLAYER PERCEPTIONS OF THE BILLET FAMILY EXPERIENCE IN JUNIOR ICE HOCKEY
Allie Lugin, Alyssa Schilthuis
Kinesiology, Oral Presentation
Section: 4, 9:30 AM, Lake Superior Room
Presentation Number: 795
Mentor(s): Emily Wright

The multifaceted and high-profile context of junior ice hockey encompasses a highly structured player development pipeline for amateur athletes (16-20 years) aspiring to reach the collegiate and/or professional ranks of the National Hockey League (NHL). In this context, players are expected to adapt to a billet family as they navigate a hyper competitive sport context. Billet family's welcome young players pursuing an elite sport pathway by providing them with a home away from home; essentially adopting players into their own family for an extended period of time. In particular, little is known regarding proxy-parental adults, such as billet families and their influence on youth athletes in junior ice hockey. Therefore, the purpose of this exploratory study was to examine player perceptions regarding the billet family experience in junior ice hockey. Eight former junior ice hockey players from the United States Hockey League (USHL) and Ontario Hockey League (OHL) were included. A qualitative approach was employed and semi-structured interviews were conducted with each participant. Thematic analysis was used to analyze the data. Results are discussed according to the overarching themes developed from this study. Practical recommendations for junior ice hockey organizations and billet families are also provided.

A CASE STUDY ON THE THERMAL EFFECTS ENDURED DURING MOTORSPORT RACING
Anthony Curvey
Kinesiology, Oral Presentation
Section: 5, 11:00 AM, Lake Superior Room
Presentation Number: 801
Mentor(s): David Ferguson, Sam Barthel

Motorsport boasts one of the largest viewing audiences worldwide. Motorsport athletes are exposed to both physical and thermal stresses and the noted rise (2-3°C) in core temperature can be detrimental to performance and safety. This case study followed two drivers, who alternated driving hourly and drove the same car during an International Motorsport Racing Association (IMSA) six-hour race at Watkins Glen International Speedway. The race occurred on July 1st, 2018 and was the hottest IMSA race on record (37.7°C). An Equivital Life Monitor, paired with an ingestible core pill, and in-lab testing allowed for the calculation and observation of heart rate, the percentage of the maximum heart rate, skin temperature, core temperature, and physiological strain index (PSI). Driver one hit physiological peaks of 192bpm in heart rate, surpassed 100% in percentage of maximum heart rate, 39.8°C in skin temperature, 40.4°C in core temperature, and had a PSI of well over 10. Additionally, driver two hit physiological peaks of 200bpm in heart rate, 99% in percentage of maximum heart rate, 39.4°C in skin temperature, 39.6°C in core temperature, and had a PSI of well over

10. Thus, competition in motorsports places a large thermal challenge on the body and therapeutic countermeasures should be developed to limit thermal strain.

EFFECTIVENESS OF NOVEL FLUID REPLACEMENT SYSTEM TO PREVENT THERMAL STRESS IN RACING DRIVERS
Bhumi Patel, Peyton Waaso
Kinesiology, Oral Presentation
Section: 5, 11:15 AM, Lake Superior Room
Presentation Number: 802
Mentor(s): David Ferguson

Automobile racing is one of the largest spectator sports in the world. It has been shown that thermal strain is primary physiological stressor placed motor racing drivers with 2-3°C increases in core temperature during competition. This places drivers at risk for heat injury. The purpose of this study was to evaluate a Fluid Replacement System to prevent thermal strain in the Baja 1000 off road race. Two participants drove identical "buggies" during the BAJA 1000 race. The drivers had similar driving experience levels. One of the drivers was equipped with the Fluid Replacement System while the other driver was supplied with a water bottle and a straw; both participants could drink ad lib. Heart rate, skin temperature, core temperature, and physiological strain index (PSI) were monitored using an Equivital Life Monitor throughout the 12-hour race. The driver with the fluid replacement system worked at a peak of 80% of his max heart rate while the driver with the water bottle worked at a peak of 100% of his max heart rate. The driver with the fluid system had an average skin temperature of 36.5°C while the driver with the water bottle had an average skin temperature of 37.5°C. Core temperature had a lower peak for the driver with the fluid system (38.0°C) compared to the driver with the water bottle reached (38.8°C). The driver with the fluid system had a peak of 6 on the PSI scale while the driver with the water bottle had a peak of 8.5 as a peak on the PSI scale. While this is a limited sample size, these results indicate that further investigation into the Fluid Replacement System is warranted as it prevented thermal strain.

PRESCHOOLERS' CLASSROOM FREE-PLAY: ACTIVITY TYPE AND INTENSITY BY LOCATION
Katie Mckee
Kinesiology, Oral Presentation
Section: 5, 11:30 AM, Lake Superior Room
Presentation Number: 803
Mentor(s): Kimberly Clevenger, Karin Pfeiffer

Preschool-aged children spend the majority of the child care day indoors, where they are predominantly sedentary. Identifying classroom locations that promote indoor physical activity can inform future activity-promoting interventions. Our purpose was to identify where children spend their indoor free-choice time, and to further characterize activity type and physical activity within these locations. Preschoolers (4-5 yrs) wore an activity monitor (accelerometer) at the right hip for one child care day while the classroom was video-recorded. Each child's location and activity type were coded continuously for one hour using Behavioral Observation Research Interactive Software (BORIS) during free-choice time. Percent of time in each location spent in total physical activity was classified using Pate cut-points (in counts/sec). Overall, 17% of free-choice time was spent being physically active. The majority of free-choice time was spent in the art (29.0% of time), manipulative (20.1%), and block (14.3%) areas. Of these areas, blocks elicited the highest amount of physical activity (27.9% of the time), compared to art (21.7%) or the manipulative area (15.6%). While activity type was fairly consistent in the art and manipulative areas and represented expected behavior, the block area encompassed multiple types of activities: block (58.8%), transition (28.9%), and manipulative (9.8%) play. Similar to previous research, large blocks elicited higher levels of physical activity compared to art and manipulative play. This may be due to the variety of activities in which children participated in this location, but future research on what specifically encouraged the high levels of physical activity should be conducted.

COMPARISON OF HEART RATE, SPEED, AND SPRINTS PERFORMED BY A DIVISION I FIELD HOCKEY TEAM
Samantha Gregoire
Kinesiology, Oral Presentation
Section: 5, 11:45 AM, Lake Superior Room
Presentation Number: 804
Mentor(s): James Pivarnik

Heart rate (HR) monitoring and accelerometry are used to evaluate players' activity during athletic competition. However, few studies have evaluated these modalities in NCAA women's field hockey. Our purposes were to evaluate players' performance using descriptive tracking information and compare differences between positions. A physiological tracking system was used to evaluate HR and movement patterns of NCAA Division I field hockey players. Aerobic

fitness (treadmill time to exhaustion; TMtime) and maximal heart rate (HRmax) were estimated from an incremental treadmill run. Data were collected from 24 women across 11 games. Players were evaluated by position (forward(n=10), midfield(n=7), back(n=7)). Groups were analyzed using 95% confidence intervals. Variables of interest included TMtime, game time spent in HRzone4(80-90%HRmax) HRzone5(>90%HRmax), maximum speed (km/h), distance traveled (m/min), and sprints performed (any movement with acceleration>2.4m/sec2). On average, players spent 32.7% of game time in HRzone4, and 53.4% in HRzone5. Position group differences were not significant. TMtime(710±40 sec), maximum speed (26±1.9 km/h) and distance traveled (100.6 m/min) were also similar. However, forwards performed more sprints (1.4±0.3 sprints/min) than midfielders (0.6±0.2sprints/min) and backs (0.5±0.2sprints/min), $p<0.05$. HR data show that field hockey is played at high intensity. Our data suggest that position groups have similar fitness, playing intensity, speed, and distance traveled during a game. Forwards likely showed more sprinting because they are primary scorers who attack the opponents' goal. Coaches should consider these results to insure practices mimic game conditions.

EXPLORING THE EFFECTS OF SIMULATED DRIVING AMONG DIVISION I NON-CONCUSSED AND CONCUSSED ATHLETES
Maddie Baker, Keegan Coles
Kinesiology, Oral Presentation
Section: 5, 12:00 PM, Lake Superior Room
Presentation Number: 805
Mentor(s): Jennifer Savage, Tracey Covassin

Sport-related concussion (SRC) rates have been on the rise in athletics within the past few decades, resulting in more stringent return to sport and learn protocols. However, little SRC research has focused on a safe return to other activities of daily living such as driving. Since the effects of a SRC implicate important cognitive and behavioral domains for driving, the absence of safe return to drive guidelines could place the driver and others at risk. The purpose of this study was to explore differences in simulated driving within 72 hours, among concussed and non-concussed athletes. A prospective cohort study design was utilized, to examine simulated driving performance in a total of 34 [male(n=26, 76.5%); female(n=8, 23.5%)] student-athletes from 10 sports. Participants completed a virtual driving course in a rural environment, during which the participants performed a memory task that required them to carry out basic arithmetic, while several driving parameters were measured. A multivariate analysis of variance (MANOVA) was performed to determine differences in simulated driving performance between concussed and non-concussed athletes. The p-value was set apriori at .05. There were no statistically significant differences found within 72 hours, between concussed and non-concussed athletes ($p=0.68$). Additionally, no differences were found on any single driving variable; road accidents ($p=0.33$) speeding tickets ($p=0.24$), centerline crossing ($p=0.19$), missed turn signal usage ($p=0.67$) and right lane excursions ($p=0.87$). We speculate that athletes may perform better in cognitive related tasks (multi-tasking, processing speed, reaction time) or have higher levels of performance compared to non-athletes.

LINGUISTICS, LANGUAGES, & SPEECH

HAVE YOU GOT 'GOTTEN'?: THE SEMANTICS OF 'HAVE GOT'
Natasha Chemey
Linguistics Languages and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 81
Mentor(s): Alan Munn, Marin Morzycki

In some dialects of English, "have gotten" and "have got" have distinct meanings. "Floyd has got food" means that Floyd possesses food, whereas "Floyd has gotten food" means that Floyd has obtained food, whether or not he has it when the sentence is uttered. Additionally, changing the tense makes the "have got" sentence fail, as in "Floyd had got food." Furthermore, "Have you got food?" and "I haven't got food" are ungrammatical for some speakers, who disallow "have" and "got" to be split. These facts pose three main problems: why does "get" have more than one meaning in the present perfect, how can we explain the lack of tense interaction, and does the explanation change if we can split "have got" into parts? This research proposes two solutions, one for each answer to the last question. The first solution proposes that "have got" is an inseparable unit in the grammar. For the other solution, "have got" is a separable unit in the grammar. Both analyses require a way to account for the possessive meaning of "have got"; past research (Pylkkänen, 2002) has proposed a silent word called the 'Low Applicative' which usually marks a transfer of possession, but occasionally has another meaning. This research proposes that one of the alternate meanings of the Low Applicative is a simple

possessive. Lastly, these analyses both propose that part of "have got" encodes the present tense; the first solution proposes the whole unit does so, whereas the second only requires "has".

COMPARING LENITION ACROSS LATIN AMERICAN DIALECTS OF SPANISH
Katelyn Weatherford, Mercedes Ramon, Anthony Delsanter
Linguistics Languages and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 82
Mentor(s): Cristina Schmitt

In many dialects of Spanish, syllable-final [s] undergoes a weakening process and therefore is sometimes reduced to an aspiration, a creaky vowel, or is completely absent. In some dialects it seems that lenition happens predominantly before particular types of consonants and in some dialects it seems to be quite widespread. Studies have also shown that speech rate impacts lenition in some dialects but not as much in others (faster speech rate=more lenition). In recordings of natural conversations these different pronunciations are sometimes very difficult to analyse and compare across dialects. In this project we compare quantitative and qualitative properties of [s] lenition in three dialects of Spanish: Argentinian, Paraguayan and Chilean. However, to improve the quality and comparability of the recordings, we used a reading task. In a first step we recorded 2 speakers of each dialect reading a text designed to elicit syllable-final [s] in a variety of contexts (sometimes as a plural and sometimes as simply part of a word, sometimes at the end of a sentence, sometimes, not) and with a variety of functions. The [s] in the recordings are then analysed quantitative and qualitatively and provide us with a way to compare the differences in pronunciation in these varieties of Spanish. The results of this reading task are then compared to the descriptions in the literature and our own free speech recordings.

THE EFFECT OF LENITION ON THE DISTRIBUTION OF QUANTITY WORDS
Anthony Delsanter, Becky Lubera, Katelyn Weatherford
Linguistics Languages and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 83
Mentor(s): Cristina Schmitt

In many Latin-American dialects of Spanish there is a process that weakens syllable-final [s] and this affects the realization of plural morphology. So, Las patas (the ducks) can have the -s produced as [s], [h] (an aspiration), or nothing at all, making it identical to the singular form "la pata". Different dialects have different constraints on where and when lenition mostly occurs and they also vary in the overall rates of lenition. In this project we ask how the variation in lenition in Chilean, Paraguayan and Argentinian Spanish impacts speakers use of "quantity" words such as cardinal numbers, quantifiers, and determiners in the noun phrases across dialects. We examine audio-recordings and transcripts of mother-child interactions from Chilean, Paraguayan and Argentinian speakers. We have two goals: first, we examine qualitative and quantitative properties of lenition between the different dialects in order to determine whether the described differences across dialects are also present in Child Directed Speech and in Child speech (4-5 year-olds); and second, we test if there is a correlation between the rates and type of lenition and the use of different types of quantity words by mothers and children. The idea is to determine whether lenition changes how the information about plurality is encoded in child-directed-speech and child speech.

FOOTBALL, CHURCH, AND FREE BREAKFAST: DOING SOCIOLINGUISTIC RESEARCH IN RURAL COMMUNITIES AROUND LANSING
Jared Kaczor, Travis Coppernoll
Linguistics Languages and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 84
Mentor(s): Suzanne Wagner

Recent work published by the MSU Sociolinguistics Lab has shown that the "Lansing accent" has been changing. But has the accent of surrounding rural areas also been changing? For the last six months we have been conducting ethnographic and sociolinguistic research in two rural towns, "Homer & Humphrey" Townships. We have been participating in community activities, such as going to local football games and participating in church social gatherings. We have audio-recorded informal interviews, transcribed them and conducted acoustic analysis of the speech. In this poster we present a case study of a single rural community member. We contrast their pronunciation with that of urban Lansing speakers. Our work contributes to ongoing research that seeks to see how far the spheres of Lansing's influence affect the speech of surrounding towns.

C-OR-PUS: EVIDENCE FOR 'OR' SCALAR IMPLICAUTRES
Rachel Stacey
Linguistics Languages and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 85
Mentor(s): Cristina Schmitt

The disjunction 'or' has multiple meanings depending on its context. It can have an 'exclusive' meaning, where it means "one or the other, but not both", as in "You can have coffee or tea". It can also have an 'inclusive' meaning, as in "I didn't have tea or coffee" meaning "I didn't have tea and I didn't have coffee". Linguists agree that the basic meaning of 'or' is inclusive, and the exclusive meaning is derived from an implicature. Previous research suggests that children struggle with access the exclusive meaning of 'or', however there is no consensus for why. This study will lay new ground work by offering a comprehensive corpus study that investigates the percentage of usage of inclusive and exclusive 'or' in child-directed speech, and what contexts lend itself to one interpretation and/or an other. The use of or will be compared with the use of some, whose interpretation is also derived by an implicature (some and not all). The results will give us a better understanding of whether children receive input data that supports contexts that facilitate calculate scalar implicature and will inform us whether children's difficulties with implicatures arise from impoverished input.

PLAYING WITH THE PERFECT
Darby Grachek, Kerry Berres, Jett Hampton, Sarah Sirna, Sarah Jones, Hollie Nusbaum
Linguistics Languages and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 86
Mentor(s): Cristina Schmitt, Komeil Kolahi Ahari, Alan Munn

This study focuses on children's production of the participial forms (eat-en, giv-en) in Perfect tenses where these forms alternate with simple past forms (ate, gave). The Perfect is formed by [have + verb-en], as in "I have gone/eaten". In modal contexts such as "he should've driven," many speakers say "he should've drove." Instead of the participle "driven", they use the simple past form "drove". This phenomenon is called participial leveling. Previous work has shown that Michigan speakers accept both forms, but it is unclear how often they produce these forms. It is even less clear which forms children use in the Perfect Tense. We hypothesize that these forms are both part of the mental lexicon of adult and child speakers of English in Michigan. To test this hypothesis, we designed a board game activity to elicit the modal Perfect form (where the character did silly things but should have done non-silly things), in order to compare children's (ages 4-5) and adults' production of the modal Perfect and simple Past forms. The results will provide us information about the use of these forms by both adults and children and will help us determine to what extent children and adults have or not the same leveling patterns.

COMPETITION BETWEEN THE PAST AND THE PERFECT
Darby Grachek, Kerry Berres, Jett Hampton, Sarah Sirna, Sarah Jones, Hollie Nusbaum
Linguistics Languages and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 87
Mentor(s): Cristina Schmitt, Komeil Kolahi Ahari, Alan Munn

The Present Perfect ("I have jumped") competes with the Simple Past ("I jumped") in many of its uses. Previous work suggests that the Simple Past is taking on more uses than before. For example, the Present Perfect and Simple Past are interchangeable in sentences like ("I've already eaten" vs. "I already ate"). However, some speakers can use both tenses interchangeably in sentences like "I lived in East Lansing since I was three" vs. "I've lived in East Lansing since I was three", while other speakers reject the past tense in this context. In this experiment, our goal is to determine whether Present Perfect in narratives will elicit speakers to use the perfect more often, so we can determine when the present perfect is necessary. Subjects will hear two stories: one story has as much Present Perfect as possible and the other has only simple past and present tenses. Participants will then have to retell the stories to a third party from memory. We hypothesize that in a narrative context where the perfect is used extensively, participants will be more likely to use the perfect to retell the story than the story that uses simple past and present. The results will tell us in what contexts they find it acceptable to use the perfect instead of simple past tense and vice versa.

WHO IS "SHE"?, AND CAN NULL SUBJECTS HELP PARAGUAYAN CHILDREN FIND OUT?
Daniel Greeson, Becky Lubera, Megan Placko
Linguistics Languages and Speech, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 325
Mentor(s): Cristina Schmitt

Spanish allows for sentences without an overt subject, such as "Estoy cansado" ('Am tired') where "yo"/'I' is not pronounced. Null and overt pronouns are preferred in different contexts, but both are grammatical. This leaves children with the task of learning when to use which form. In Mexican Spanish, overt subject pronouns generally refer to a different person than the previous subject, while null subject pronouns are preferred when maintaining the same reference as the previous subject. Previous studies hypothesized that this contrast can be acquired if children first track null and overt pronouns in the domain of first- and second-person pronouns ("yo", 'I' and "tú", 'you'), then use this knowledge from the 1/2-person domain to help them interpret 3rd person pronouns. However, a potential problem lies in the fact that dialects of Spanish vary in the acceptability of overt subjects in different contexts. One such dialect is Paraguayan Spanish which allows overt pronouns in many more contexts than other varieties of Spanish. Because of this difference, it's possible that the learning path differs for Paraguayan Spanish-speaking children. Using an Argentinian corpus of Paraguayan mother-child interactions we examine the distribution of null/overt subject pronouns across 1st, 2nd, and 3rd person contexts, and also across contexts with and without a switch in pronoun reference. Our goal is to show how children who speak this dialect end up learning to interpret pronoun reference.

IS LESS MORE FOR LEARNING PRONOUNS?
Daniel Greeson, Mercedes Ramon, Megan Placko
Linguistics Languages and Speech, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 326
Mentor(s): Cristina Schmitt

Unlike English, Spanish allows for sentences without an overt subject, as in "Voy a la tienda" ("Am going to the store"), where "I" is not pronounced. Although both overtly pronounced and null subject pronouns are grammatical, they don't have identical distributions of use. How do children learn their distribution? In Mexican Spanish, when a subject refers to the same entity as the previous subject, pronoun omission is preferred; when the referent of a given subject is different than the previous one, an overt subject is preferred. Previous studies hypothesized that this contrast is learnable from the language input that children receive in two steps: (1) children track that overt 1/2 person pronouns ("yo", 'I' and "tú," 'you'), whose reference is unambiguous, correlate with a change in who the pronoun refers to, and null indicates the same subject as before within a stretch of discourse; (2) children then extend this knowledge to 3rd person pronouns. This proposal requires children to track pronoun properties across sentences within the discourse. In this project, we ask if an even narrower learning path is possible, namely one in which children track 1st and 2nd person pronouns only in clauses embedded within other clauses. We examine a corpus of interactions between 6 Mexican mother-child pairs to determine whether it is possible to learn what the null vs. overt distinction indicates with respect to the reference of the pronominal subject using only embedded clauses, or whether children need a longer or wider discourse window.

WHO ARE THEY?: BOOKS, PRONOUNS, AND MOTHER-CHILD INTERACTIONS
Abby Jaroszewicz, Erin Marchert, Natasha Chemey
Linguistics Languages and Speech, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 327
Mentor(s): Cristina Schmitt, Alan Munn

Any conversation requires attention from the participants to both what is said and to what is considered to be shared knowledge (the common ground). Children and adults often have different strategies to determine the information that can be assumed to be in the common ground; for example, a child might say, "They ate lots of carrots," without realizing that the person they're talking to might not know who "they" refers to. In this study we are interested in how mothers reading to their children handle potential pronoun ambiguities. We recorded videos of mothers reading a book that we designed to a child. We aim to determine whether there is any awareness of the ambiguous pronouns, and if there is any correlation between the attentiveness of a child and the attention given by the mother to the textual ambiguities. Pronouns can be difficult when navigating the discourse. Even when the antecedent is in the discourse, pragmatic principles are still required to connect the two. Recent work (Hirsh-Pasek et al. 2015) suggests that the quality more than the quantity of speech children hear is important for language development and later on literacy development.

However, the properties measured are mostly related to how "good" the interaction is in terms of engagement and attention. In this project we examine how the quality of interaction affects pronoun resolution. Results of this research may inform teacher training and early literacy guidelines.

RELATIONS AMONG HOME LITERACY ENVIRONMENT AND PHONOLOGICAL AWARENESS SKILLS OF YOUNG CHILDREN WITH SPECIAL NEEDS
Lauren Lee, Madelyn Marchiori, Raymond Abbo
Linguistics Languages and Speech, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 328
Mentor(s): Sarah Goodwin, Lori Skibbe

Parents who provide a richer home literacy environment (HLE) have children with greater phonological awareness (PA) skills (Burgess et al., 2002). PA is the ability to rhyme, blend, and segment sounds and words and is an important component of learning to read (McDowell et al., 2007). A child's HLE is related to the materials provided in the home and the emphasis placed on developing early literacy skills by parents (Foster et al., 2016; Froyen et al., 2013). Recent work has found that maternal education corresponds to higher language functioning in typically developing children ages two to four (Conant et al., 2017; Skibbe et al., 2008). However, less is known about the association between the PA of children with speech/language difficulties and their HLE. The aims of the study are to 1) investigate relationships between the HLE and PA for children with disabilities and 2) examine whether maternal education level explains the relations observed. Children (n=215; ngirls=75; ages 3 to 8) with special needs (existing diagnoses including but not limited to autism spectrum disorder, attention-deficit/hyperactivity disorder, and/or hearing difficulty) took the newly-developed Access to Literacy Assessment System- Phonological Awareness. Additionally, parents completed a questionnaire about HLE (e.g., "How often do you read to your child?"). By discovering whether there is a link between HLE (including maternal education) and the development of PA in children diagnosed with speech and language difficulties, further recommendations can be made in helping families implement interventions to develop their children's early language skills.

INVESTIGATING THE USE OF DISTAL PROSODY IN SPEECH SEGMENTATION IN CHILDREN
Shubhangi Sharma, Anusha Mamidipaka
Linguistics Languages and Speech, Poster Presentation
Section: 2, 3:00 - 4:30 PM, Ballroom
Presentation Number: 329
Mentor(s): J McAuley, Carrie Kroger

Prosody refers to the patterns of pitch and rhythm in speech. Much work in the domain of prosody has focused on the role of local prosodic cues for speech segmentation. In the past decade, there have been a series of studies that have examined the role of distal (temporally removed from a target portion of an utterance) prosodic cues in speech segmentation. These studies have shown that adult listeners use 'upstream' repeating pitch patterns to aid 'downstream' speech segmentation in line with a perceptual grouping hypothesis. The current study examined whether young children (ages 6-7) with typical language development (TLD) use distal prosodic cues to segment speech using an artificial language paradigm. Children listened to 12 disyllabic words from an 'alien' language and then read them aloud from flashcards. Participants then heard sentences constructed in the 'alien' language and monitored for target words within each sentence. The repeating pitch pattern applied to the beginning of sentences was either congruent or incongruent with the pitch pattern target words located toward the end of sentences. Half of the sentences did not contain target words, but rather were replaced by two-syllable items that were the reverse of target words. Participants rated from 1(lowest) - 6 (highest) how well they heard the word in the 'alien' sentences. Based on the perceptual grouping hypothesis that proposes that rhythmic cues at the beginning of an utterance are used to group downstream syllables into words, congruent words were predicted to be rated higher (more word like) than incongruent words. Results will be discussed with respect to this hypothesis.

HOW TALKER RHYTHM AFFECTS SPEECH UNDERSTANDING IN NOISE
Sarah Dec, Paul Clancy, Audrey Saggau-Drotos, Anusha Mamidipaka
Linguistics Languages and Speech, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Ballroom
Presentation Number: 330
Mentor(s): J McAuley

The ability to understand speech in difficult listening conditions varies greatly within the population. Hearing acuity accounts for some of the variance in speech-in-noise (SIN) ability, but a large portion of variance remains unexplained. One factor that may account for individual differences is listener ability to track the rhythm of the to-be-attended talker. Building on Dynamic Attending Theory (DAT) (Jones & Boltz, 1989), the present study investigated the role of talker rhythm in speech understanding in noise using the *Coordinate Response Measure* (CRM) paradigm (Bolia et al., 2002). Participants listened to spoken sentences in the form "Ready [call sign] go to [color] [number] now" and reported the color and number of a target talker that says "Ready Baron-". In Experiment 1, target sentences were presented with either 2- or 6-talker background sentences, while the rhythm of the target and background talkers was modulated by either 0% or 50%. Listeners were best at identifying the target color and number in the rhythmic-target/arrhythmic-background condition, whereas they were worst in the arrhythmic-target/rhythmic-background condition; this pattern held for 2- and 6-talker backgrounds. In Experiment 2, the target was presented with 2-talkers in the background and the rhythm of either the target or background was parametrically manipulated (0%, 25%, 50%, or 75%). As modulation of the target rhythm increased, performance on the target sentence decreased; conversely, as masker modulation increased, performance increased. Results from both experiments provide support for DAT and highlight the role of talker rhythm in understanding speech in difficult listening conditions.

NEURAL CORRELATES AND PARENTAL REPORT OF ATTENTION IN CHILDREN
Alex Haver, Lauren Caramagno
Linguistics Languages and Speech, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Ballroom
Presentation Number: 331
Mentor(s): Erica Lescht, Amanda Hampton Wray

A growing body of literature is improving understanding of the brain functions that underlie selective attention in children through the use of neuroimaging techniques, such as event-related brain potentials (ERPs). While this knowledge is valuable, it has limited clinical application, as ERPs cannot be easily acquired outside of medical or research facilities. Therefore, it is important to understand how the brain functions for attention relate to more clinically usable measures, such as parent report of child attention behaviors. To date, understanding of the relationships between brain functions and parent reports is limited, though a recent study revealed that increased reports of child problem behaviors were associated with slower neural responses for inhibition tasks. Establishing relationships between brain functions for and parent reports of attention behaviors will help interpret information collected in clinical settings, potentially providing more specific targets for treatment, thereby improving services for clients struggling with attention-related behaviors. The current study aims to evaluate relationships between brain functions for selective attention and parent reports of attention-related behaviors in young children with typical development, aged 3-7 years. ERPs were collected using a dichotic listening selective attention task and parents completed questionnaires regarding their child's behaviors at home and school. The effects of attention on brain functions will be compared with parent reports of child behavior. Findings and implications will be discussed. Future studies will include children with atypical development, such as communication disorders.

PHONOLOGICAL AWARENESS SKILLS AND THE LANGUAGE USE SETTINGS OF YOUNG BILINGUAL CHILDREN
Eric Farhadi, Toufic Haddad, Sonia Padmanabhan
Linguistics Languages and Speech, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Ballroom
Presentation Number: 332
Mentor(s): Sarah Goodwin, Lori Skibbe

Phonological awareness (PA), or the ability to rhyme, blend, and segment sounds and words, is crucial for young children in order to learn to read. Thus, stakeholders need a PA measure appropriate for diverse populations, including children acquiring languages other than English. There is evidence that bilingual children perform similarly to or better than their monolingual peers on English semantic and phonemic tasks. Although younger children (ages 3-5) may show weaker speech or language performance, these difficulties become less of a concern once children reach school age. However, less is known about whether bilingual children's English use settings (e.g., home, school, or both) may

influence their PA. It was predicted that children who use both their languages simultaneously in the home would have stronger PA skills than children who use one language more often than another. Parents of bilingual children ages 3 to 7 (*n* = 50) completed a questionnaire about their child's home learning and language activities. Questionnaires included items about children's language acquisition and ages of use, including settings in which languages were used. Children took the Peabody Picture Vocabulary Test-4, letter name/sound knowledge, and PA assessments in English, including a new tablet-delivered assessment, Access to Literacy Assessment System- Phonological Awareness. Results indicate diverse language use settings of children's native languages as well as wide ranges of vocabulary and PA ability. Implications for bilingual education and early childhood programs will be discussed.

COMPARATIVE ANALYSIS OF THE AUTISM SPECTRUM DISORDER EVALUATION IN THE MEDICAL FIELD VERSUS EDUCATIONAL SETTING
Megan Nylund, Ilana Cooper
Linguistics Languages and Speech, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Ballroom
Presentation Number: 333
Mentor(s): Matthew Phillips

This research aims to analyze the differences between the medical and educational diagnosis of the Autism Spectrum Disorder (ASD). Our analyses will look at the definition of ASD in terms of both settings, as well as analyze the diagnosis process, and their comparative differences among the different areas of study. Within this discussion, questions regarding qualifications, as well as the different team approaches will be answered. Additionally, the analysis will include any additional disorders that would qualify under either diagnosis. Overall, the main aim of the research is to show that ASD must be diagnosed twice in order to receive full services for students throughout their life, both in and out of the K-12 educational setting.

MEASURING WHAT YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDER SEE AND HEAR WHEN PLAYING WITH THEIR PARENTS: A FEASIBILITY STUDY
Rachel Houtteman, Jessie Magalski
Linguistics Languages and Speech, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Ballroom
Presentation Number: 334
Mentor(s): Courtney Venker

The goal of our study is to evaluate the feasibility of measuring what children with Autism Spectrum Disorder (ASD) see and hear using video cameras positioned at multiple angles to record parent-child play sessions. This is important information to gather because there is substantial evidence suggesting that the relationship between what these children see and hear may be misaligned, which contributes to their difficulties in learning language. Though this project is related to Dr. Venker's broader line of research, the specific goal of the proposed project is the feasibility of measuring auditory-visual input using video is distinct. The feasibility of this study depends on the video camera's ability to capture the child's eyes when a specific toy is addressed by the parent. A drawback during our research has been the camera's inability to zoom, making the child's eye gaze difficult to capture from a great distance despite the multiple angles. By purchasing video cameras that can zoom, we will be able to pinpoint what the child is looking at during the parent-child play sessions. This will allow us to obtain more reliable data for what the children see, versus what they hear during these parent-child play sessions.

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DISEASE

OSTHOLE: A NATURAL PLANT DERIVATIVE INHIBITS MRGPRX2-INDUCED MAST CELL RESPONSES
Brianna Callahan
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 68
Mentor(s): Hariharan Subramanian

Mast cells are key mediators of immediate hypersensitivity and allergic responses. A novel G protein-coupled receptor MrgprX2 expressed on these cells has been implicated to play a major role in initiating pseudo-allergic reactions. The purpose of our study was to evaluate the inhibitory properties of Osthole in MrgprX2 related pseudo-allergic immune

responses and elucidate its mechanism of action. We used the human mast cell line LAD2 to test the effects of Osthole in regulating mast cell activation, in an effort to identify an inhibitor that could be potentially used to treat pseudo-allergy in humans. Osthole (7-methoxy-8-(3-methyl-2-butenyl)-2H-1-benzopyran-2-one) a natural coumarin derived from the Cnidiumplantsignificantly inhibitedmast cell activation following MrgprX2 stimulation of LAD2 cellsusing 3 different agonists: Compound 48/80, a histamine promoter, and Substance P,a neuropeptide, and cathelicidin LL-37,a host defense peptide. The in vivomouse models show a decrease in LL-37 induced rosacea after treatment with Osthole. Compound 48/80 induced paw edema showed the same trend. In addition, in vitrostudies using human mast cell line LAD2 showed a significant decrease in Ca2+mobilization, and in b-Hexosaminidaserelease indicating degranulation. A significant reduction in cytokine release was observed in Osthole treated cells.In addition, western blot analysis revealed that Osthole inhibited the activation of ERK1/2 (a mitogen activated protein kinase) that regulates mast cell release of inflammatory mediators. In summary we have identified a natural plant compound Osthole that attenuates mast cell activation in vitroand in vivocould hence be used for controlling mast cell mediated inflammatory and pseudo-allergic responses.

CHARACTERIZATION OF SURFACTANT-PRODUCING BACTERIA FROM MIDDLE EAR ISOLATES ON MINIMAL MEDIA MIMICKING NATURAL OTIC ENVIRONMENT
Mariam Charles
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 69
Mentor(s): Gemma Reguera

Biological surfactants are amphiphilic molecules that decrease surface tension of fluid, and is a property seen in both eukaryotes and prokaryotes. Human surfactant secreted in the middle ear plays a role in host defense against otic pathogens. Surfactants can be a relief for individuals experiencing recurrent middle ear infections, known as otitis media. When traumatic events occur to the middle ear, such as fluctuating pressure changes seen in divers, normal functionality can be inhibited. Though long believed to be sterile, preliminary experiments performed in my lab have shown it possible to cultivate bacteria from the middle ear. With the knowledge that many bacteria secrete surfactants, we are looking at the potential for these organisms to produce bacterial surfactants with similar properties to human surfactants. If so, these organisms could be engineered to provide protection as probiotics to further combat otitis medias and trauma. To explore this possibility, isolates were screened for surfactant production using a mineral oil drop assay. Preliminary studies identified which bacterial strains produced surfactants on an enriched media (TSA). Bacteria will be plated on TSA media, showing reproducibility, as well as otic media which mimics the environment of the middle ear. By doing so, it could be observed that by placing bacteria in a middle ear-like environment alters or improves surfactant production by the bacteria that would not have been otherwise seen on TSA. This can provide further insight into which bacteria could be utilized in middle ear-oriented probiotics.

USING GRADIENT CULTURE TECHNIQUES TO ACHIEVE GROWTH AND OBTAIN ISOLATED SPECIES FROM THE LOST CITY HYDROTHERMAL FIELD
Miranda Pryde
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 70
Mentor(s): Osama Alian, Matt Schrenk

The Lost City Hydrothermal Field (LCHF) is a hydrothermal vent system, where rock high in magnesium and iron reacts with seawater in a process called serpentinization, which releases hydrogen and heat and leads to the synthesis of various carbon molecules. The molecules and hot alkaline water emerge through cracks in the seafloor called vents and form structures called chimneys. Chemical gradients form within the chimneys and are likely utilized by microorganisms for energy. Currently, no organisms from the LCHF have been isolated, making precise metabolic characterization of community members difficult without bioinformatic methods, also made difficult by the unknown status of carbon sources which organisms there use. In an effort to obtain isolates, we are using a previously described method[1], modified to represent the possible gradients within LCHF and testing the ability of various carbon molecules to be used as a substrate for growth. After inoculating with viable LCHF samples, initial findings have shown changes in the gradients possibly indicating growth, though the microbe identities are still unknown. Cocci and filamentous microbes in assemblages were observed using light microscopy as well as mineralization patterns related to the gradients within the experiments. Some of the assemblages observed were associated with minerals present within the gradients. Taken together these observations show the methods chosen work well for replicating the conditions found at LCHF that

stimulate microbial activity and some of the abiotic chemical reactions. Using this model more in depth studies may be carried out to better understand the dynamics of the vent environment.

COMPARATIVE GENOME ANALYSES TO DISTINGUISH RHIZOBIA STRAINS
Blake Bezemek
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 71
Mentor(s): Nejc Stopnisek, Ashley Shade

Bacteria belonging to the genus Rhizobium are common members of the soil microbiome and are best known for their ability to fix atmospheric nitrogen in symbiotic relationships with legume plants. They fix nitrogen within specialized compartments on the roots called nodules. To date, more than 110 Rhizobium species have been identified, but some are not able to engage in symbiotic nitrogen fixation with plants. Rhizobium sp. genomes are relatively large, containing a chromosome of approx. 5Mbp and a plethora of plasmids with varied sizes which carry essential genes for nitrogen fixation. Rhizobium sp. displayed different nodulation patterns on diverse host plants, which might be attributed to their differences in gene and/or plasmid content. Thus, this study aims to provide means for Rhizobium sp. differentiation by genome comparison of their core and accessory genes. In particular we are interested in i) genetic differences between known symbiotic and non-symbiotic Rhizobium sp., ii) differences in functional genes essential to nitrogen fixation of symbiotic Rhizobium sp. and iii) genetic signatures that provide these species competitive advantage in nodulation as compared to other rhizobia lineages (e.g. Mesorhizobium, Sinorhizobium, Bradyrhizobium). We expect to locate key differences in functional genes, describe the pangenome of symbiotic Rhizobium sp., and identify potential genetic markers involved in selective nodulation of the common bean (Phaseolus vulgaris). We next will apply this information to understand the rhizobia selection for wild and domesticated common bean, an important Michigan crop that has generally poor nitrogen fixation.

THE EVALUATION OF HUMAN VAGINAL MICROFLORA OF BACTERIAL VAGINOSIS INDIVIDUALS USING CMEIAS SOFTWARE OF COMPUTER ASSISTED MICROSCOPY
Zara Sragi
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 72
Mentor(s): Scott Mulrooney, Frank Dazzo

Bacterial Vaginosis (BV) is a polymicrobial disease of the human vagina. Although the mechanism that changes its community structure is not well understood, key microbes have been identified that follow the progression of BV (reduction in dominance by *Lactobacillus* and replacement with *Gardnerella, Prevotella, Atopobium, Mobiluncus*, and others). This disease is typically diagnosed by light microscopic examination of Gram-stained vaginal smears to assign a "Nugent Score" reflecting the changes in relative proportions of cell morphotypes in the vaginal microbiome. However, due to the subjectivity of that supervised classification system, the Claeys Scoring system was developed to make the diagnosis of BV more objective and reproducible. In this study, we used **C**enter for **M**icrobial **E**cology **I**mage **A**nalysis **S**ystem (CMEIAS) Bioimage Informatics software developed at MSU to analyze the vaginal microflora of several patients with and without BV and quantify the changes in colonization of their vaginal microflora as the disease progressed. This software improves the microscopical analysis of bacterial communities through the use of digital image editing and accurate morphotype classification. We compared the morphotype Classification II and the Operational Morphological Units Classification III analysis systems in CMEIAS to determine whether the OMU classifier more definitively detects shifts in bacterial community diversity based on inclusion of statistically recognized size subclasses for each microbial morphotype community member. Using these tools of microbial ecology, we created a Low, Intermediate, and High BV Classification system that can enable scientists to objectively and accurately diagnose BV in affected patients using CMEIAS computer-assisted microscopy.

BLOCKADE OF SLAMF7 RECEPTOR ENHANCES ANTI-TUMOR IMMUNITY AND PROLONGS THE SURVIVAL FOR TUMOR-BEARING MICE
Sean Hyslop
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 73
Mentor(s): Yasser Aldhamen

While immune cell costimulatory and inhibitory receptors have been targeted to develop immunotherapies for multiple types of cancer, there is still a need for development more potent immunotherapy. The signaling lymphocytic activation molecule family number 7 (SLAMF7) is a member of the SLAM family of receptors, which are critical for immunoregulation. Our previous work has shown that co-administration of SLAMF7 Fc fusion protein along with antigen significantly induces Th-1-skewing innate and adaptive immune responses. Here, we developed a novel viral vector that expresses a murine SLAMF-Fc (rAd5-SF7) and show that rAd5-SF7 administration in established CT26 colon adenocarcinoma tumors enhances anti-tumor responses. Compared to controls, rAd5-SF7 mediates blockade of SLAMF7 increased NK cell expression of CD69 and IFNγ, enhanced dendritic cell maturation and macrophage activation. Co-vaccination of mice with rAd5-SF7 and CT26 tumor lysate enhanced CT26-specific B- and T-cell memory immune responses and antibody dependent cell-mediated cytotoxicity (ADCC), increased survival rates, and suppression of tumor growth. Our data suggest that targeting SLAMF7 signaling is a novel immunotherapy strategy that enhances innate and adaptive anti-tumor responses, and warrants further testing for clinical application as a cancer immunotherapy.

USING MICROSCOPY TO INVESTIGATE MYCOBACTERIUM SMEGMATIS MUTANTS AND TEST FOR THE PRESENCE OF AN ELONGATED CELLULAR PHENOTYPE
Dylan Slagh
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 74
Mentor(s): Robert Abramovitch

Mycobacterium smegmatisis a non-pathogenic bacterium that is related to the human pathogen Mycobacterium tuberculosis, the leading cause of death via bacterial infection worldwide. M. smegmatis, being both faster growing and nonpathogenic, is an ideal research tool for indirectly studying M. tuberculosis.Previously, a transposon mutagenesis screen wasperformed to identify mutants of M. smegmatiswhich could survive in citrate buffered medium and multiple mutants were identified, including three distinct insertion mutants of a gene with amino acid sequence similar to that of ZapE, a division-associated ATPase previously described in E. coli. Because this protein and the E. Coli protein ZapE were similar in their amino acid sequence, we hypothesized that null mutants in both organisms would share a phenotype of cell elongation under stress, which has been previously identified in ZapE null mutants in E. coli. To investigate this hypothesis, we grew mutant, complemented mutant, and wild type strains of M. smegmatis in MOPS buffered as well as citrate buffered media and observed how the distribution of their cell lengths changed over the course of 4 hours. We observed no quantitative difference in the strains lengths, providing evidence against our original hypothesis. There was however a significant difference between the MOPS and citrate conditions in how the cell lengths changed over the course of the four hours. Future research will involve performing this test under various stressors such as temperature and oxidative stress, to further confirm or invalidate the hypothesis.

SOURCES OF VARIATION IN SEROLOGICAL PREVALENCE OF TOXOPLASMA GONDII
Adam Hafner
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 160
Mentor(s): Eben Gering

Toxoplasma gondii (phylum: apicomplexa) is a eukaryotic parasite that infects wildlife and humans worldwide. Many animals and humans (e.g. immunocompromised patients and neonates) also exhibit serious side effects of infection. There are simple tasks that can be done to ensure that the spread of the parasite dwindles in the coming years. However, reducing T. gondii prevalence requires 1) understanding the parasite's current distribution (among regions and host species). 2) identifying factors that explain historical changes in infection prevalence. By collecting data from the scientific literature, we have prepared a graphical summary of prevalence that shows, through different images, the distribution of the parasite 1) among continents, 2) among different host species, 3) over time. These visual summaries

provide helpful tools to communicate T. gondii's prevalence to other researchers. Meanwhile, our ongoing quantitative analyses of parasite prevalence can inform wildlife management practices that will reduce T. gondii's harmful impacts on human and non-human hosts.

ANTIGENIC COMPLEMENTARITY: IDENTIFYING MICROBIAL TRIGGERS OF TYPE 1 DIABETES USING PROTEIN HOMOLOGY
Kaylie Chiles, Miah Turke
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 161
Mentor(s): R Root-Bernstein

Type 1 diabetes mellitus (T1DM) afflicts over a million Americans, with an estimated 40,000 new cases every year. T1DM is characterized by the body's failure to produce insulin, which results from autoimmunity against pancreatic beta cells. The exact cause of this autoimmune attack is unknown, but the theory of antigenic complementarity provides a potential explanation. In the context of T1DM, this theory suggests that coinfection by two different microbes bearing antigens that mimic human insulin and the insulin receptor triggers the immune system to produce antibodies against these self-antigens. Homology searching yielded a list of bacteria and viruses with proteins that closely resemble insulin and its receptor. Top hits included clostridium compared to insulin and coxsackievirus compared to the insulin receptor. Blood serum from T1DM patients was analyzed for the presence of antibodies against clostridium and coxsackievirus; binding affinity of these antibodies for their complementary self-antigens was assessed. The degree to which antibodies bind to one another is determined using an enzyme-linked immunosorbent assay (ELISA), which provides a detectable color change to indicate binding. To ensure that binding between the serum antibodies (which are complementary to clostridia and coxsackievirus antigens) and the insulin and receptor self-antigens is not a fluke, negative controls were run to show lack of binding between the antibodies of interest and other targets. Binding between antibodies against microbial antigens and human insulin and insulin receptor proteins suggests that coinfection by clostridia and coxsackievirus may be a trigger for the autoimmune attack against the body's insulin-producing cells.

TIME COURSE OF EOSINOPHIL RECRUITMENT IN TRP53-KNOCKOUT MICE EXPOSED TO HIGH-FAT DIET AND OXYBENZONE: IMPLICATIONS FOR MAMMARY TUMORIGENESIS
Molly Mcsween
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 162
Mentor(s): Richard Schwartz, Anastasia Kariagina

The immune system plays an important role in breast cancer development. Eosinophils are important effectors of immune function, and also play a necessary role in mammary gland development. *Trp53* is one the most frequently mutated genes in human breast cancer, and mammary gland tissue from *Trp53-knockout* mice provides a useful model for mammary gland tumorigenesis. Other studies in the lab have identified a high-fat diet (HFD) and oxybenzone, the active ingredient in most sunscreens, as having promotional effects on mammary tumorigenesis. Our previous studies showed that HFD and oxybenzone increase eosinophil recruitment to developing mammary glands of 13-week-old mice with *Trp53-knockout* mammary glands. This could promote mammary tumorigenesis through the release of eosinophil cytokines such as IL-4, which can promote the development of tumor-promoting M2 macrophages. To further understand the time course of eosinophil recruitment to mammary tissue, we examined eosinophils in 26-week-old mice. Mice transplanted with *Trp53-knockout* mammary tissue were randomly assigned into HFD and low-fat diet groups and terminated at 26 weeks of age, when mammary glands were collected. Mammary gland tissue sections were stained with Vital New Red to identify eosinophils. After photomicrographs were taken at 40x magnification, the number of eosinophils around epithelial structures were recorded across treatment groups. Comparing 26-week-old and 13-week-old mice may reveal whether eosinophil recruitment is maintained or associated with a specific time in development. Correlation of this with other analyses of cytokine expression and the status of macrophages will help to elucidate the mechanisms for HFD and oxybenzone-induced tumor promotion.

INFLUENCE OF OXYBENZONE ON MAMMARY TUMOR PROLIFERATION
Mitchell Borin
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 163
Mentor(s): Richard Schwartz, Anastasia Kariagina

Oxybenzone (benzophenone-3; BP-3) is a common ingredient in many North American skincare products including sunscreen. Previous research in the lab showed this chemical to increase cell proliferation in normal mouse mammary glands. The goal of the current study is to see whether BP-3 influences tumor growth in p53 knockout mammary glands, already prone to tumor development. BP-3 impact was examined alongside that of diet, specifically content of saturated fat from red meat. Mice were either given low fat diet (10% calories from fat; LFD) or high fat diet (60% calories from fat; HFD) and either maintained on LFD their entire life or switched from one diet to the other at puberty (10 weeks of age). These 3 diet groups were fed with or without BP-3 compounded into their food (70 mg/kg of body weight). When tumors reached 1 cm in diameter, mice were treated with the nucleotide analog BrdU, and then tumors were harvested for sectioning, stained with antibody to BrdU, and counterstained with DAPI. DAPI stains the DNA of all cells and BrdU specifically indicates cells actively synthesizing DNA. This allows analysis of the proportion of proliferating cells. Analysis was performed separately for different tumor histopathologies, spindle cell and epithelial. Increased proliferation was found in most BP-3 treated groups across both histopathological tumor types, with more pronounced effects in mice fed high fat diet with BP-3. These data suggest that BP-3 may increase tumor proliferation and that products with BP-3 should be used with caution.

ENVIRONMENTAL BACTERIOPHAGE INFECTING SHIGELLA SHOW NOVEL GENOMIC AND STRUCTURAL CHARACTERISTICS
Hailee Perrett
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 164
Mentor(s): Kristin Parent, Jason Schrad , Sarah Doore

Bacteriophages are viruses that selectively infect bacterial hosts and may come to serve as an alternative treatment for traditional antibiotics. The continued discovery of environmental bacteriophages can be used to identify therapeutic candidates. The Parent lab facilitated an outreach with Lincoln Southwest High School in Lincoln, Nebraska to identify novel bacteriophages. This collaboration involved high school students in hands-on research to promote science practice in the classroom and enabled the collection of environmental phage samples from a new geographic area. Eleven novel bacteriophages were isolated and characterized according to their protein composition, host range, morphology, and genome size from 50 environmental samples. Following characterization efforts, the genomic and structural characteristics of environmental isolates were further analyzed by the Parent lab. These results demonstrate the prevalence of *Shigella* bacteriophages. The most common type of *Shigella*-infecting bacteriophages show significant similarities in genomic content and morphology across geographic regions among this family. Additionally, one novel podovirus (short-tailed) bacteriophage was analyzed using cryo-EM imaging techniques. A preliminary 3D reconstruction demonstrates that this isolate has unusual morphological features and warrants further analysis.

SECOND MESSENGER REGULATION OF HRPS CONTROLS ON HRP-TYPE III SECRETION SYSTEM IN ERWINIA AMYLOVORA
Jacob Hieber
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 165
Mentor(s): Christopher Waters, Brian Hsueh

The ubiquitous second messenger molecule, cyclic-di-GMP (c-di-GMP), regulates a wide variety of cellular behaviors in many bacterial species. The Gram-negative plant pathogen *Erwinia amylovora* transitions between survival in biofilms to systemic plant infection via the Hrp-Type III Secretion System (T3SS). Evidence suggests that c-di-GMP plays a role in this transition by regulating biofilm formation, motility, and the T3SS. The Hrp-T3SS is regulated by the protein HrpS, an enhancer-binding protein (EBPs). Previous research in our lab has indicated that c-di-GMP interacts with EBPs in other bacteria to regulate downstream pathways, including the activation of biofilms and inhibition of motility. I hypothesize that HrpS interacts with c-di-GMP, or its derivatives, to regulate T3SS in *E. amylovora*. Preliminary findings indicate that pGpG, the breakdown product of c-di-GMP by EAL-containing phosphodiesterases, outcompetes c-di-GMP when

binding to HrpS. I hypothesize that c-di-GMP and pGpG may competitively bind to the HrpS protein, thereby inhibiting or activating its function, respectively. The proposed interplay between c-di-GMP and pGpG regulation of the *hrpS*-induced T3SS suggests that modulation of c-di-GMP and pGpG is vital to the pathogenesis of *E. amylovora.* Through a reporter system, I can test second messenger regulation of the HrpS protein, and therefore regulation of its target genes. Furthermore, this system can be used to determine the HrpS binding sites on hrpS. If this model is verified, it would be the first evidence of pGpG interacting with an effector protein to regulate genes and could lead to important discoveries of pGpG's signaling role in other related bacteria.

HISTOLOGICAL ANALYSIS OF STRESS IN PORCINE GUT
Kyle Cotter
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 239
Mentor(s): Adam Moeser

Early life adversity (ELA) affects gastrointestinal (GI) health later in life, such as development of GI disease, allergies, and irritable bowel syndrome (IBS). An important mediator of these diseases is the mast cell, which can be observed through tissue histology slides. The goal of this study is to better understand how early life stress impacts the morphology of the GI mucosa and mast cell presence, and to determine which specific histological embedding method is most suitable for each tissue type. The two methods for preparing histology slides are paraffin embedding and cryopreservation. Ileum, jejunum, and colon tissues were collected from pigs that were early weaned (EW), a model of early life adversity, and late weaned (LW). Samples from each tissue were cut into two equal size sections; one was embedded in paraffin, and the other was frozen in optimal cutting temperature (OCT) medium. The samples were then sliced, placed on slides, Toluidine-blue stained to identify mast cells, and hemotoxylin and eosin stained to compare morphology. Slides were imaged across various areas of tissue to assess robustness of staining as well as tissue and mast cell integrity. Images were analyzed using ImageJ software to determine mast cell concentration in tissue samples. This data provides insight on the effects of ELA on mast cell infiltration in the gut.

TREATING INFECTIONS IN CYSTIC FIBROSIS LUNGS
Kyle Mccoy
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 240
Mentor(s): Alessandra Hunt, Christopher Waters

Cystic Fibrosis (CF) is an autosomal recessive disorder caused by a mutation in the CFTR (cystic fibrosis transmembrane conductance regulator) gene. The CFTR gene codes for an ion channel protein that conducts chloride and thiocyanate ions across epithelial cell membranes. When the CFTR is mutated, the resulting protein becomes misfolded affecting chloride ion channel function and leading to a dysregulation of epithelial fluid transport in organs like the lungs. The most challenging clinical outcome of CF is a chronic biofilm infection in the thick, accumulated mucus of the lungs by the bacterium Pseudomonas aeruginosa. Biofilms, which are communities of microorganisms embedded in extracellular polysaccharides, often cannot be treated with antibiotics due to innate resistance and tolerance mechanisms. We hypothesized that a combination of existing antimicrobials with synergistic effects may offer advantages to one antibiotic alone. An earlier drug screen we conducted identified that triclosan, a known antimicrobial routinely used is soaps, hand sanitizers, and toothpastes, combined with tobramycin, a common antibiotic used to treat CF patients, killed in vitro biofilms 100 times better than either compound alone. To further develop this potential treatment, we must test is similar synergism to kill P. aeruginosa biofilms is observed in the environment of a mammalian lung. Therefore, we plan to infect CF mice with a clinical strain of Pseudomonas aeruginosa capable of establishing lasting biofilms, treat the infections with either vehicle, tobramycin alone, triclosan alone, or the combination, and quantify viable bacteria from lung explants. These experiments will help to determine if tobramycin/triclosan can serve as a novel treatment for CF.

IDENTIFYING THE MECHANISM OF ACTIVATION OF THE PHOSPHOLIPASE CAPV BY CYCLIC-GMP-AMP IN VIBRIO CHOLERAE
Alyssa Corpus
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 241
Mentor(s): Christopher Waters, Geoffrey Severin

The bacterial pathogen *Vibrio cholerae* is the causative agent of the diarrheal disease cholera, which has caused millions of deaths. The current pandemic (7th) is perpetuated exclusively by the El Tor *V. cholerae* biotype. One significant genetic difference between this biotype and those responsible for the previous six pandemics is El Tor's maintenance of the unique 15kb genomic island, VSP-1. While most of the genes in VSP-1 remain unexplored, a novel second messenger signaling network encoded entirely in VSP-1 has recently been characterized. The enzyme DncV synthesizes the cyclic dinucleotide (cdN) c-GMP-AMP (GAMP), which in turn binds to and directly activates the phospholipase activity of the enzyme CapV. Activation of CapV results in rapid degradation of El Tor's cell membrane and hyper-activation occurs following ectopic expression of DncV, resulting in cell death. However, the molecular mechanism by which cGAMP activates CapV has yet to be elucidated. We propose to identify CapV's cGAMP binding site by utilizing targeted site-directed mutagenesis to generate CapV variants and assessing their cGAMP-dependent activation following expression of DncV. Guided by a computationally derived model of CapV, we have identified two unique residue loops which lie outside of the enzyme active site, are found only in CapV orthologs associated with DncV-like enzymes, and encode numerous arginine residues- which commonly mediate protein binding to cdNs. Understanding how CapV is regulated by cGAMP will have implications for identifying cGAMP-dependent enzymes in other bacteria that contain DncV orthologs.

DISTINGUISHING BETWEEN REGULATORY AND EVOLUTIONARY OUTCOMES OF EMERGENT ANTIBIOTIC RESISTANCE IN FLAVOBACTERIUM JOHNSONIAE
Morgan Fleck
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 242
Mentor(s): Ashley Shade, John Chodkowski

Environmental microorganisms produce a wide variety of antibiotics. These antibiotics provide a competitive advantage in the surrounding environment by facilitating interference competition with other microbes. When antibiotics are present, it follows that resistance mechanisms have also evolved. We've observed a potential adaptive outcome between an antibiotic-producing strain, *Burkholderia thailandensi*s, and an antibiotic-sensitive strain, *F. johnsoniae* that were co-cultured on agar plates to allow for metabolite interactions. Over the course of long-term co-culture interactions, *F. johnsoniae* (co-Fj) lines developed increased resistance to the antibiotic. Because the resistance appeared to develop gradually, we hypothesized that efflux was the mechanism of resistance, and then conducted experiments to show synergy in antibiotic efficacy when *F. johnsoniae* was treated with the antibiotic and an efflux pump inhibitor, supporting our hypothesis. The purpose of this study is to determine if resistance in co-Fj lines is transient (regulatory) or evolved (mutation). Like the antibiotic, ethidium bromide (EtBr) is a molecule that is also extruded through efflux. Because EtBr increases in fluorescence when bound to DNA, we can measure changes in fluorescence (high-intracellular, low-extracelluar) as proxy for efflux efficiency. Efflux kinetics were measured without antibiotics to allow for comparison between the ancestral strain (WT) of *F. johnsoniae* and the co-Fj lines. Comparison of efflux kinetics would allow us to distinguish between regulatory and evolutionary outcomes. If the resistance is found to be evolved, then our next path of study would be to determine which genes are the cause of the resistance.

CHARACTERIZING INHIBITORY MECHANISMS OF A LACTOBACILLUS SPECIES AGAINST CAMPYLOBACTER JEJUNI COLITOGENESIS
Keenan Odea
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 243
Mentor(s): Linda Mansfield

C57BL/6 IL-10 knock out (KO) mice are laboratory models for investigating inflammatory bowel disease (IBD). When exposed to the foodborne pathogen Campylobacter jejuni, the knockout of IL-10 blocks inflammation-suppressive mechanisms in the gut and colitis results. However, in a recent experiment where mice were inoculated with colitogenic

C. jejuni strain 11168, mortality rates in C57BL/6 IL-10 KO mice were low and histopathologic lesions were mild, suggesting that the mice had been protected from colonic inflammation. Coincident with this finding an unidentified bacterium appeared on Campylobacter-selective isolation plates cultured from the feces of both infected and sham-inoculated mice. Matrix-assisted laser desorption/ionization time of flight (MALDI-TOF) mass spectrometry identified the organism as a Lactobacillus species, and this result was corroborated by sequencing of the 16S gene and whole-genome sequencing. Primary Bolton agar plates were streaked and incubated to produce isolated colonies of C. jejuni strain 11168. Colonies were suspended in Bolton agar at 48oC and 20 mL were decanted into petri plates. Supernatant from Lactobacillus cultures grown in de Man, Rogosa, and Sharpe (MRS) broth at 37oC for 48 hours was added to wells cut into the Bolton agar, which contained suspended C. jejuni. After incubation for 48 hours at 37oC, no zones of clearance were observed around the wells, indicating that the Lactobacillus had not inhibited the in vitro growth of C. jejuni under the culture conditions. Further studies are in progress investigating the protective properties of this Lactobacillus in vivo.

SMALL RNAS WITH BIG IMPACTS ON BACTERIAL VIRULENCE FACTORS
Ishani Pandya
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 244
Mentor(s): George Sundin, Jeffrey Schachterle

Erwinia amylovora is a gram-negative bacterium that causes fire blight disease, which primarily affects apple and pear trees. To successfully infect, *E. amylovora* utilizes several virulence factors such as biofilm formation, carbon utilization, exopolysaccharide (EPS) formation, motility, catalase activity, and siderophore production. Bacterial small RNAs (sRNAs), which are post-transcriptional regulators in biological processes, play roles in regulation of numerous traits. The primary goal of this study is to screen known *E. amylovora* sRNAs in order to determine which sRNAs regulate virulence factors. We screened mutants, which lack sRNAs, and overexpression strains carrying plasmids from which sRNAs are overexpressed. Assays examining the virulence factors above were performed for the individual mutants and over-expression strains, and we found that Hrs21, an sRNA previously known to affect virulence through an unknown mechanism, positively regulates amylovoran and levan. Because it is known that amylovoran and levan are exopolysaccharides used by *E. amylovora* to avoid the host defense system, this provides a potential explanation for the Hrs21 regulation of virulence. We also found that several sRNAs appear to regulate localization of catalase activity, which protects *E. amylovora* from host-produced reactive oxygen species. Some strains exhibit greater secreted catalase activity whereas in wild-type cells, catalase activity is primarily intracellular. This study serves to connect various sRNAs, which exist in *E. amylovora,* to the specific virulence factors they are affecting. Understanding how sRNAs are impacting specific biological functions may allow for the development of more efficient methods in dealing with bacterial infections in plants.

SLAMF7 SIGNALING IN IFN-ALPHA-STIMULATED HUMAN MONOCYTES UPREGULATES THE 4-1BB-ADAPTOR PROTEIN OF OUR GENE OF INTEREST
Ariana Angarita-Medrano
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Ballroom
Presentation Number: 245
Mentor(s): Yasser Aldhamen, Andrea Amalfitano, Patrick Oconnell, Maja Blake, Cristiane Pereira Hicks, Yuliya Pepelyayeva, Sarah Roosa

The signaling lymphocytic activation molecule F7 (SLAMF7) is known to be upregulated in diseases characterized by chronic immune activation, such as HIV. We found that the SLAMF7 receptor has a critical immunomodulatory role during type I interferon stimulation of human monocytes of HIV patients. SLAMF7 signaling counteracts IFN receptor-mediated alpha chemokines production, and prevents HIV viral infection of human monocytes. The objective of this study is to investigate the molecular mechanism of SLAMF7 receptor signaling in activated human monocytes. Our targeted gene contributes to the control of chronic viral infection and can limit inflammation by associating with the T cell co-stimulatory molecule, 4-1BB. Previous investigations demonstrated that viral infection reduces the expression of our gene of interest in T cells, causing them to become exhausted and non-responsive. To study SLAMF7's role in human monocytes, CD14+ cells were isolated from peripheral blood mononuclear cells (PBMCs) by magnetic beads negative selection kit. The cells were then stimulated with IFN-α (100 IU/ml) in the presence or absence of SLAMF7-activating antibody. After 6 hours, total RNA was isolated and the expression level of target genes was evaluated by qRT-PCR. Interestingly, our study revealed that, unlike several genes that were inhibited by SLAMF7, the expression levels of the targeted gene were significantly ($p<0.001$) higher in SLAMF7-activated cells, as compared to cells stimulated with IFN-

alpha alone. Our data suggest that SLAMF7-mediated upregulation of the gene of interest could be a novel immunotherapeutic strategy for enhancing T cell responses to cancer and infectious diseases-derived antigens.

EFFECTS OF MITOGEN-ACTIVATED PROTEIN KINASES ON GROUP B STREPTOCOCCUS SURVIVAL IN MACROPHAGES
Elena Borges
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 561
Mentor(s): Shannon Manning

Group B Streptococcus (GBS), a leading cause of neonatal complications and mortality, colonizes the vaginal and gastrointestinal tracts in approximately 30% of pregnant women. Previous research from our lab has demonstrated that genetically diverse GBS strains vary in their ability to survive intracellularly in macrophages. These findings suggest that persistent colonization may be linked to a strain's ability to survive phagocytosis and thereby evade host immune responses and antibiotic treatments. However, it is not clear which specific intracellular mechanisms in macrophages enable GBS to survive phagocytosis or how these mechanisms are manipulated by genetically distinct GBS strains during infection. To explore these questions, we examined changes in intracellular signaling pathways in THP-1 macrophage-like cells following infection with five diverse GBS strains using an antibody-based protein array and Western Blotting. Our results indicated that the p38 and JNK MAPK pathways were activated in THP-1 cells in response to GBS infection, and that strains more frequently associated with severe disease tended to induce more robust activation of these pathways. Based on these data, we hypothesized that the p38 and JNK pathways may play a role in the enhanced survival of more virulent GBS strains. Consequently, our current analyses are focused on comparing changes in GBS uptake and survival in macrophages in the presence of small molecule inhibitors that selectively target key proteins in the identified pathways. We anticipate that this work will provide important insights for the development of new therapeutics to combat severe GBS disease.

INVESTIGATING THE REGULATION OF A MULTI-DOMAIN PROTEIN THAT CONTROLS BIOFILM FORMATION IN BURKHOLDERIA CENOCEPACIA
Megan Seyerle
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 562
Mentor(s): Christopher Waters

Burkholderia cenocepacia is an environmental Gram-negative bacterium notoriously known for causing chronic infections in patients with cystic fibrosis. One important facet of *B. cenocepacia* infection is the ability to form biofilms. Biofilms are complex matrices made of billions of bacteria whose formation is regulated by molecular signaling. The gene *rpfR*, which controls the degradation of the biofilm regulatory molecule cyclic dimeric guanosine monophosphate (c-di-GMP), is important for biofilm formation in *B. cenocepacia*. Interestingly, experiments in our lab demonstrated *RpfR* could also make c-di-GMP, in contrast to what is reported in the literature. This lead us to our hypothesis that there are interacting proteins mitigating synthesis of c-di-GMP in *B. cenocepacia*. To address this hypothesis, we are using the tractable microorganisms *Vibrio cholerae* to co-express *RpfR* and other *B. cenocepacia* genes to determine if protein-protein interactions disrupt the synthesis of c-di-GMP by *RpfR*. A review of the literature uncovered two potential genes of interest: *rpfF* and *gtrR*. When we express *RpfR* in *V. cholerae*, we observe a wrinkly phenotype, indicative of biofilm formation and high intracellular c-di-GMP levels. When *RpfR* and *RpfF* are co-expressed, colonies appear wrinkly and dense and are distinct from expression of either protein alone. This all suggests that there is variation in activation of certain domains of *RpfR*. Further studies will focus on how co-expression of *RpfR* and other proteins alter activity of *RpfR* and change intracellular c-di-GMP levels.

COMPARING THE EFFECTS OF MONOCYTES ISOLATED FROM HIV-NEGATIVE AND HIV-POSITIVE DONORS ON ASTROCYTE SECRETION OF PROINFLAMMATORY MEDIATORS
Sera Sermet
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 563
Mentor(s): Norbert Kaminski

HIV is an infectious virus that affects 37 million people globally. With the development of antiretroviral therapy, HIV-infected individuals are able to live longer and healthier lives. Despite effective treatment, health complications remain, and are becoming more evident as individuals age. Approximately 30-50% of HIV-infected patients have cognitive dysfunction, caused, in part, by neuroinflammation. Part of this neuroinflammation is characterized by activated monocytes trafficking into the brain and releasing virions, proinflammatory and neurotoxic factors. The monocyte-derived factors released may have a direct effect on neuronal injury along with an indirect effect by causing astrocyte dysfunction. Astrocytes are a type of glial cell found in the brain that have several important functions including secretion of cytokines and chemokines, which when dysregulated, can promote a positive feedback loop of neuroinflammation. In the Kaminski lab, we are interested in examining the impact of human monocytes on astrocyte secretion of proinflammatory factors. Past studies have demonstrated increased levels of activated monocytes in HIV-positive donors compared to HIV-negative. Therefore, we hypothesize that monocytes isolated from HIV-infected donors will promote a more robust astrocyte secretion profile of inflammatory mediators compared to monocytes from HIV-negative donors. To address this hypothesis, monocytes will be isolated from HIV-negative and HIV-positive donors and co-cultured with primary astrocytes. The co-culture will be stimulated with various toll-like receptor agonists and an array of inflammatory factors (e.g. MCP-1, IL-6 and IP-10) will be measured in the supernatant.

APPLE REPLANT DISEASE: ROTTEN TO THE CORE
Joanna Colovas
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 564
Mentor(s): Ashley Shade, Ari Bintarti

In Michigan, there are upwards of 11.3 million apple trees for growing commercial produce. A statewide problem facing apple growers is apple replant disease (ARD). ARD occurs after older or less productive apple trees are removed, and new apple trees planted in these locations are compromised and lack vigor. Major symptoms of ARD are stunted growth, reduction in root biomass, and high probability of death in the first year. We hypothesize that this may be in part predicted by the interactions between the apple tree roots and the nematode, fungal, and bacterial communities in the tree-associated soil. In fall 2018, soil rhizosphere samples were collected at the Michigan State University Clarksville Research Center from 14 different 22′ by 42′ orchard plot conditions, with 6 replicates for each condition. Across sampling locations, there was variability in the time since removal of the original tree, the method of removal (e.g. complete removal or herbicide treated), and the 2018 status (e.g. cover type planted or fallow). From each plot, soil cores were collected and analyzed for soil chemistry, nematode community composition, and cultivation-independent microbiome analysis for bacteria and fungi using amplicon sequencing of genetic markers of diversity. Currently, it is being investigated as to which microbes specifically lead to the onset of ARD in newly planted apple trees. Illumina sequencing is being used to determine which microbes are present in the 2018 samples. The implications of these findings will help apple growers across the state of Michigan to manage ARD in the future.

IDENTIFYING DIAGNOSTIC TARGETS FOR PATHOGENIC NONTUBERCULOUS MYCOBACTERIA
Lauren Sosinski
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 565
Mentor(s): Janani Ravi

Nontuberculous mycobacterial (NTM) infections are incredibly detrimental to livestock in the agriculture community and cause secondary infections in humans. Currently, there are no effective vaccines against NTM, and diagnosis techniques include, but are not limited to, testing clinically healthy cattle fecal matter and lymph nodes at slaughter. However, the bacterial diagnoses between the lymph nodes and fecal matter drastically differ. The only way to get an accurate diagnosis is after the infection has spread or the animal is near death. Secondary infections by NTM that occur in humans require long-term treatment and can become a chronic, and expensive, issue. Therefore, there is a critical need for

improving the methods for diagnosing, treating, and vaccinating against NTM. In this project, I plan to identify protein targets for diagnosis in NTM by first determining known virulence factors and diagnostic targets in other mycobacteria, such as M. tuberculosis, and identifying the homologs in NTM using the BLAST database. I will use molecular evolutionary approaches (sequence-structure-function and phylogenetic) to determine the domains and genomic neighborhoods of these homologs. These analyses will show how these genes have evolved, what their putative functions are and whether they can be used as diagnostic targets. Finally, I will compare the genomes of pathogenic NTM to both Mycobacterium tuberculosis and nonpathogenic NTM to ensure specificity and sensitivity of the identified targets. This will allow me to find unique proteins in pathogenic NTM, which could be used for early and effective diagnosis.

ROLE OF RARE EARTH ELEMENTS IN PLANT GROWTH PROMOTION BY METHYLOBACTERIUM STRAINS
Alli Hurt
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 566
Mentor(s): Colleen Friel

Metal ions are vital for the function of many enzymes in nature. However, the biological role of rare earth metals known as lanthanides has been largely ignored until very recently. Lanthanides can alter and enhance one-carbon (methylotrophic) metabolism. One potential application of lanthanides is in agriculture, as lanthanides have been shown to increase the benefit provided by methylotrophic bacteria to plants. However, the mechanisms by which methylotrophs benefit plants and the way in which lanthanides affects this process is unknown. In order to test the theory, many different strains of methylotrophic bacteria were isolated from the surface of soybean leaves. These strains exhibited significant variation in their ability to utilize different carbon sources, which may have important implications for their ability to grow in the phyllosphere. In this project, the different strains isolated will be compared and mixed to determine the combination that provides the most beneficial growth enhancements to the soybean plants. Week-old soybean plants will be inoculated with one of the following treatments: sterile buffer without lanthanides, sterile buffer with lanthanides, buffer with bacteria and no lanthanides, and buffer with bacteria and lanthanides. After 3-4 weeks of growth, we will measure plant biomass to determine which treatment provided the largest benefit to the plant.

OPTIMIZATION OF MULTIPLEX BLOOD MEAL ANALYSIS ASSAYS IN ANOPHELENES
Diamond Day-Bell
Microbiology Immunology and Infectious Disease, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 567
Mentor(s): Elahe Crockett-Torabi, Karl Seydel

Introduction: Sub-Saharan Africa is responsible for a disproportionately high share of the global malaria burden. Malaria is endemic in the country of Malawi and is spread by the bite of the female *Anopheles* mosquito. The two most common vectors in Malawi are *Anopheles arabiensis* and *Anopheles funestus*, both of which prefer to feed nocturnally on humans. As interventions are put into place to lower the country's malaria burden, the foraging behavior of these mosquitoes will likely change. The use of bed nets prevents this preferred feeding, resulting in mosquitoes feeding on alternate hosts. The optimization of a multiplex PCR blood meal assay was developed based on well-established single-plex assays which test for five hosts: human, cow, dog, goat, pig. Hypothesis: Analysis of blood meals collected over the past three years shows a host distribution of 64.6% human, 1.7% cow, 0% dog, 0.57% goat, and 0% pig. Mosquitoes will be collected again in early 2019 after a mass distribution of bed nets in October 2018. This assay will be repeated on blood meals from these mosquitoes and it is expected that nonhuman blood meals will increase. Methods/Results: A PCR diagnostic technique was optimized using a universal reverse primer and species specific forward primers. Following gel electrophoresis, hosts are determined based on base-pair size. Conclusion: The optimization of this high throughput assay will increase lab efficiency as well as save time, money, and reagents in the post-bed net analysis. Support: D.D.B. is a REPID Scholar, supported by NIH-R25-HL108864 award to E.C.

THE GREAT WHITE AMANITA: DECIPHERING THE AMANITA BISPORIGERA SPECIES COMPLEX THROUGH TOXIN PROFILING AND PHYLOGENETICS
Judson Vanwyk
Microbiology Immunology and Infectious Disease, Oral Presentation
Section: 5, 1:30 PM, Room 36
Presentation Number: 811
Mentor(s): Gregory Bonito

Amanita bisporigera is a pure white mushroom species that is deadly poisonous if consumed, hence its common name, the Destroying Angel. This mushroom species is native to North America and is responsible for human and pet fatalities every year. This mushroom contains lethal amounts of amatoxins and phallotoxins, which inhibit protein synthesis. The presence, composition and concentration of toxins varies across specimen. Recent phylogenetic studies indicate that A. bisporigera is a species-complex, likely consisting of multiple cryptic species. This hypothesis may help explain the wide toxin variability that has been found between mushroom specimen. However, this hypothesis has not been tested directly. The method of this research is to use phylogenetics to resolve species in the *Amanita bisporigera* species-complex, in order to test for variation in toxin presence and concentration within and between species. Fresh collections of white Amanita were collected in Michigan during the Fall of 2018. Each mushroom was flash-frozen and phenotyped for amatoxin and phallotoxin analysis using liquid chromatography and mass spectroscopy (LCMS). Sequences of the Internal Transcribed Spacer (ITS) region of the rDNA and second subunit of the RNA Polymerase single copy protein gene are being generated from these mushrooms, and toxin profiles will be mapped onto the resulting phylogenetic tree. Our preliminary analysis have identified at least one novel toxic species in this complex, which we are working to formally describe.

ACETYL PHOSPHATE LINKS CENTRAL METABOLISM TO BIOFILM FORMATION IN VIBRIO CHOLERAE
Niklas Kiel
Microbiology Immunology and Infectious Disease, Oral Presentation
Section: 5, 1:45 PM, Room 36
Presentation Number: 812
Mentor(s): Christopher Waters

Vibrio cholerae is the causative pathogen of the diarrheal disease cholera. Switching between a motile, planktonic state and a sessile biofilm is critical for *V. cholerae* survival in their environment and the host. Biofilms are communities of bacteria encased in an extracellular matrix secreted by the bacteria, and they act as a physical barrier between bacteria and the environment. Biofilms are problematic in both medicine and industry, and thus it is critical to understand how they are formed. In *V. cholerae* VpsR is the master transcription factor that regulates biofilm formation. In order to activate transcription of the biofilm forming genes, VpsR requires two signals: the second messenger cyclic di-GMP (c-di-GMP), which responds to environmental changes, and phosphorylation the protein. While interaction of c-di-GMP with VpsR has been well characterized, the source of VpsR phosphorylation remained a mystery. Based on *in vitro* analysis of VpsR, we hypothesize, that VspR is directly phosphorylated by the high-energy metabolite acetyl-phosphate. To test this hypothesis, I will delete the *V. cholerae* genes required to synthesize acetyl-phosphate. We predict that VpsR activity, and consequently the expression of biofilm forming genes will decrease dramatically in strains unable to synthesize acetyl-phosphate. Finally, I will test if mutants that lock VpsR in a constitutively active phosphorylated state will be epistatic to the loss of acetyl-phosphate. My studies will probe the connection between central metabolism, via acetyl-phosphate, and biofilm formation in *V. cholerae*, and solve a decades old mystery of how VpsR is phosphorylated.

DIFFERENTIATED MOUSE TROPHOBLAST STEM CELLS INFECTED WITH LISTERIA MONOCYTOGENES
Josie Altman
Microbiology Immunology and Infectious Disease, Oral Presentation
Section: 5, 2:00 PM, Room 36
Presentation Number: 813
Mentor(s): Jonathan Hardy, Jonathan Kaletka

The bacterium *Listeria monocytogenes* can cross the placental membrane and infect human and animal fetuses. This infiltration can result in fetal mortality or neurodevelopmental defects in the offspring. In order to further understand how this happens, the main focus of this experiment was to see how *L. monocytogenes* affects the cells that create the outer layers of the placenta, which begins as a trophoblast stem cell (TSC). TSCs differentiate into other cells to create functional components of the placenta that serve as an interface between mother and fetus. For example, TSCs can differentiate into syncytiotrophoblast cells (STC) which create the syncytium. The syncytium is a part of the labyrinth layer of the placenta and has an important role in nutrient exchange. In this presentation, I will explain how TSCs from

C57BL/6 mice were differentiated with activin, retinoic acid, or CHIR99021, which is a WNT pathway activator. In order to test the susceptibility of the cells to infection from *L. monocytogenes*, the cells were infected with a strain of *L. monocytogenes* that expressed bioluminescence. IVIS technology quantified the growth of *L. monocytogenes* inside of the cells by measuring luminescence. This experiment presents a better understanding of how differentiated trophoblast stem cells are infected with *L. monocytogenes* and possible effects it has on the placenta. Our differentiated trophoblast model gives insight on how *L. monocytogenes* crosses the placental membrane and causes lethal and neurological consequences to the fetus.

RAPID DETECTION OF CLINICALLY RELEVANT BACTERIA INCLUDING ACINETOBACTER BAUMANNII
Madison Patrus
Microbiology Immunology and Infectious Disease, Oral Presentation
Section: 5, 2:15 PM, Room 36
Presentation Number: 814
Mentor(s): Brett Etchebarne

The rapid detection and diagnosis of bacteria allows for a faster response and a more tailored treatment regimen, improving patient care and outcomes. Our lab has worked to develop a rapid detection method that identifies many clinically relevant bacterial loads in 70-120 minutes. Acinetobacter baumannii, an opportunistic bacterium that infects those in the hospital with compromised immune systems, was recently added to the panel of 27 other infectious bacterium (In-Dx). Sensitive and specific primers were generated and tested for Acinetobacter baumannii, and filtration was used to rapidly concentrate the bacteria from the hospital samples as soon as they arrived at the lab. Then, loop-mediated isothermal amplification (LAMP) reactions were run to increase the amount of DNA and allow for detection of the bacteria. Up to 12 samples can be run on one 96 well plate, with the thermocycler analyzing fluorescence of the SYTO-82 dye electronically. However, bacteria can also be identified by discerning the color change in Eriochrome Black T dye using only a heating block. This reduces the equipment and resources needed, increasing both the number of labs that can utilize this method and the amount of people it can help. Our results have indicated that the In-Dx panel allows for faster detection of the clinical infections while maintaining accuracy.

THE SEARCH FOR NOVEL SECOND MESSENGERS
Nils Benning
Microbiology Immunology and Infectious Disease, Oral Presentation
Section: 5, 2:30 PM, Room 36
Presentation Number: 815
Mentor(s): Christopher Waters

Bacteria use nucleotide-derived second messenger signals to respond to variations in the environment. These signaling pathways regulate numerous bacterial behaviors including central metabolism, motility, development, and natural competence. For example, the well-studied and ubiquitous cyclic mononucleotide (CN) cyclic AMP (cAMP) regulates central metabolism while the cyclic dinucleotide (CDN) cyclic di-GMP (c-di-GMP) regulates biofilm formation and motility. Despite increasing interest in second messenger signaling, little is known about the diversity of CN and CDN signaling. To address this lack of knowledge, we screened for 8 species of CN and CDN in Gram negative and Gram positive bacteria as well as some eukaryotes using liquid chromatography tandem mass spectroscopy (LC-MS/MS). Interestingly, we observed high concentrations of cyclic di-uridine monophosphate (c-di-UMP) in eight out of nine of the organisms analyzed including *Sacchromyces cerevisiae*. To confirm the presence of c-di-UMP, we measure c-di-UMP synthesis in cell lysates. Lastly, we will further verify these results by growing bacteria in stable isotope labeled D-glucose and monitoring cell lysates for isotope labeled c-di-UMP. Together, these results demonstrate novel CNs are present in various bacterial and eukaryotic species. Further, we demonstrate that the previously uncharacterized CDN c-di-UMP is actively synthesized. Future work will aim to identify the factor responsible for synthesizing c-di-UMP and roles the CDN in *S. cerevisiae* physiology.

NEUROSCIENCE

DENDRITIC SPINE DEVELOPMENT IN THE SOMATOSENSORY CORTEX OF A MOUSE MODEL OF FRAGILE X SYNDROME
Mia Railing
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 358
Mentor(s): Joseph Beatty, Charles Cox

Fragile X Syndrome (FXS) is a neurodevelopmental disorder caused by a silencing mutation in the *Fmr1* gene encoding the RNA-binding protein FMRP, which is highly expressed in neurons. Absence of FMRP at neuronal synapses leads to increased synaptic excitability and hinders synapse development. These alterations are attributed to the FXS phenotypes observed in humans and animal models including: hyperactivity, learning deficits, repetitive behavior, and epilepsy. Further research has shown that mouse embryos exposed to valproic acid (VPA) during gestation develop autistic-like behaviors similar to FXS. In the neocortex a majority of excitatory synapses occur at dendritic spines and studies have proposed a physiological link between the FXS dendritic spine phenotype and hypersensitivity. However, recent studies have not compared spine phenotype in a genetic model to a chemical model of autism. We generated datasets for two time points for wildtype (WT) and *Fmr1* knockout (KO) mice; one during development, postnatal day 30 (P30), and in adulthood (P90+). Using two-photon laser imaging of layer 5 (L5) pyramidal neurons in somatosensory cortex, we analyzed apical and basal dendrites for changes in spine density, length, and morphology. Our results show an increase in spine density and a decrease in spine length for L5 neurons in somatosensory cortex in the KO condition at P30. However, there is no difference in spine density and length in adult KO mice compared to WT. With this result we provide initial morphological evidence of a neuron phenotype that will be compared to the chemically-induced VPA model of autism.

IS THERE A CHEMICAL BASIS FOR NEURONAL CO-TRANSMISSION?
Katarzyna Purzycka
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 359
Mentor(s): R Root-Bernstein

Most neurons store and release more than one neurotransmitter. No one knows why some neurotransmitters are co-stored and co-released in particular pairs while most possible pairs are not observed. We propose that evolution selected for complementary molecules that are able to bind to each other, thus stabilizing them against degradation and increasing their concentrations by lowering their solubility. It follows that transmitters that are co-stored and co-released neurotransmitters chemically bind to each other, while pairs of neurotransmitters that are not found together do not bind to each other. We examined binding of non-peptide transmitters to other non-peptide transmitters as well as to peptide transmitters using UV spectroscopy. Some pairs displayed significant binding; these included all but one of the co-stored non-peptide pairs and most of the peptide-non-peptide pairs. Other neurotransmitters did not bind to each other and these are generally not found to be co-stored and co-released. The results show that, for the most part, compounds that are co-stored and/or co-released will demonstrate binding to each other, generally supporting the hypothesis that molecular complementarity may have played a major role in selecting for co-stored and co-transmitted neurotransmitters.

EXTERNAL STIMULATION TO ATTENTIONAL BRAIN NETWORKS MODIFIES VISUAL TASK PERFORMANCE
Andrew Becker
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 360
Mentor(s): Taosheng Liu, Mengyuan Gong

When given a task goal, priority signals sent by higher order attentional networks can change task performance in a visual behavioral task. These signals serve to modify representations of visual stimuli within the brain and in the process allow for changes of perception and subject response. Based on previous work, these attentional networks are suggested to work in a complementary manner to construct abstract representations of complex visual stimuli. A feature dimension such as orientation can be represented in discrete or continuous representations. Brain regions with discrete preference showed invariant signal change with increased angular separation while continuously represented regions showed increased decoding for an increased angular separation. This study is meant to elucidate the functional

representations of different brain regions by suppressing pieces of the circuit and comparing subject performance. Subjects complete a visual detection task where they detect speed up of a visual dot field in an attended direction. Attention is directed to one of two superimposed dot fields and dot field angular separation is varied between trials. This same task is repeated with offline stimulation by magnetic fields to suppress brain activity of attentional regions. It is expected that performance drops at the loss of task specific attentional demands. For example, disruption of attentional signals for continuous representation drops performance at small angular offset where fine representation is required. These inferences seek to interpret the ways visual stimuli are changed by attentional regions and represented in an abstract framework.

INHIBITORY CONTROL OF THE LAYER SIX CORTICOTHALAMIC FEEDBACK SYSTEM
Kelly Bonekamp
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 361
Mentor(s): Shane Crandall

The layer six corticothalamic (L6 CT) system enables the cortex with the ability to modulate its own input by providing feedback to shape incoming thalamic information. It has recently become clear that the net influence (enhancement or suppression) of CT feedback on thalamic excitability is dynamic and depends critically on the rate at which CT cells fire (Crandall et al., 2015). Thus, to facilitate our understanding of CT systems, we must know how CT activity is controlled. This study sought to determine how feedforward inhibitory circuits in layer six are recruited by thalamus and their role in controlling the output of CT cells. To target these inhibitory neurons, I used three different transgenic mouse lines that each express fluorescent protein in one of the three populations of GABAergic neurons in the neocortex. To gain optical control over the thalamic afferent to L6, I performed viral injections encoding a variant of the light sensitive cation channel, Channelrhodopsin-2, into somatosensory thalamus. Obtaining acute brain slices for whole cell electrophysiology allowed me to record activity of known populations of cells in layer six in response to optically-evoked thalamic stimulation. Recording simultaneously from a fluorescently tagged inhibitory cell as well as a known excitatory cell allowed me to compare the relative strength of thalamic input to each population of cells. Information gained during this study will provide new insight about how distinct feedforward inhibitory circuits can control CT circuit output and thereby how and when the cortex can modulate processing in thalamus.

QUANTITATIVE MOTION ANALYSIS APPLICATIONS
Alec Labadie, Matt Rhodes
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 362
Mentor(s): Mark Reimers

For many studies in behavioral science, it would be very valuable to have a highly detailed and precise record of the motion of an animal or person. Quantitative motion analysis has many applications, including diagnosis of neurological afflictions such as autism or anxiety. Phenotypical expression that denotes abnormal movement or movement patterns can be quantified with our method and provide a valuable source of diagnostic criteria in animals and people in a clinical setting. The recent development of deep learning image analysis methods makes it practical to identify specific body parts, termed key points, of an animal or person automatically across many image frames. This poster describes our efforts to implement two motion capture by computer vision systems, one for animals and the other for people. We find the animal system requires good deal of training and depends sensitively on lighting conditions. About 95% of estimated positions appear to be within 3% of range of motion, but some errors are quite large. We find that the human system, which is already been pre-trained on many millions of human images, works fairly well on novel images but has an error rate of roughly 5% constituting large errors. We are applying statistical signal processing techniques to try to eliminate the errors. We hope to systemize our procedure to capture the movement of animals and people in a standardized way to provide detailed quantitative data about how the movement pertaining to various conditions and disorders is different than unaffected populations.

EVALUATING THE ROLE OF OREXINERGIC PROJECTION TO THE DORSAL RAPHE IN REGULATING AFFECTIVE BEHAVIORS
Faiez Samad, Hang Xiong
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 363
Mentor(s): Lili Yan, Hang Xiong

The neuropeptide orexin (hypocretin) has been implicated in many important physiological functions including wakefulness, reward, and mood regulation. The objective of the present study is to probe the role of orexinergic projections to the dorsal raphe in regulating anxiety- and depression-like behaviors in an animal model of Seasonal Affective Disorder (SAD). SAD involves depressive symptoms recurring in winter when there is less sunlight. Our previous work developed an animal model of SAD utilizing the diurnal Nile grass rat (Arvicanthis Niloticus), which shows increased depression and anxiety-like behaviors in a winter-like 12:12 hr dim Light-Dark (dimLD) condition compared to those in a summer-like bright Light-Dark (brLD) cycle. In this study, we tested the hypothesis that light modulates affective behaviors through an orexin-orexin receptor 1 (OX1R) pathway from the hypothalamus to the dorsal raphe nucleus (DRN). The animals received stereotaxic injection of AAV-OX1R-shRNA into the DRN. A pilot study revealed that the treatment resulted ~60% knockdown of OX1R expression within the DRN compared to the control group treated with scrambled (SC)-shRNA. Following the injection, animals were kept in brLD conditions 4 weeks prior to behavioral assessment. Behavioral paradigms including the open field test and forced swim test were used to assess behavior. Based on the hypothesis, we predict that disrupting the orexin-OX1R pathway to the DRN through AAV-mediated knockdown will lead to increased depression- and anxiety-like behaviors compared to SC-shRNA treated controls. The results will provide better insight into the role of orexinergic signaling in modulating emotional process.

EFFECT OF RE-EXPOSURE TO COCAINE-PAIRED CONTEXT AND SUBSEQUENT RETRIEVAL OF DRUG MEMORY ON DOUBLECORTIN
Anu Kolawole, Doris Olekanma
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 364
Mentor(s): Amy Arguello

Cocaine-use relapse is a problem in treatment of addiction and has been associated with exposure to drug-related environmental cues. Rodent models of drug relapse have been used in previous studies to elucidate the role of signaling molecules; however, there is a lack of evidence for the role of plasticity-related molecules, particulary doublecortin (DCX). This study focused on the influence of re-exposure to cocaine-paired context and subsequent retrieval of drug memory on DCX protein levels within the dorsal hippocampus (DH). Rats were trained to self-administer cocaine in a specific environment where lever presses were paired with cocaine infusions. During extinction in a second, distinct context, responses were not paired with infusion of cocaine. Following a 15-minute memory reactivation test, where rats were exposed to previously drug-paired context, tissue punches were acquired from the DH and DCX protein levels examined using western blotting. Exposure to previously drug-paired context increased active lever presses. Additionally, we observed an increase in protein levels of DCX in the DH after cocaine-context memory reactivation. DCX is highly expressed in the subgranular zone of the hippocampus, one of several sights of ongoing adult neurogenesis. Therefore, future directions will focus on determining whether the increase in DCX within the DH is localized to the subgranular zone, and if it is due to increased number of DCX-positive cells. Immunohistochemical analysis of increased DCX expression would allow us to analyze cell type DCX-positive cells, given that amoeboid versus granular shaped DCX-positive cells provide information on the type of maturing cells that are affected by drug-memory reconsolidation.

BEHAVIORAL RESPONSE TO MAGNETIC FIELDS IN GLASS CATFISH
Ryan Hunt
Neuroscience, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 464
Mentor(s): Galit Pelled

Kryptopterrus bicirrhis (Glass Catfish) is known to express the electromagnetic perceptive gene (EPG) which increases intracellular calcium levels, leading to cellular excitability in response to electromagnetic stimulation. EPG has a great potential to develop into a non-invasive modulator of cell function. The purpose of this study is to quantify the natural

magnetic avoidance behavior of *K. bicirrhis*. This could lead to better understanding of the characteristics of EPG function and for future optimization of this technology. Thirteen *K. bicirrhis* were placed in a y-maze and exposed to a Neodymium Rare Earth Magnet which produced a static magnetic field of 450mT or to a sham stimulus. Magnet and sham location were always located in arm one. We hypothesized that the number of fish in arm one would significantly decrease when exposed to the magnet. Three starting positions (each arm of the Y-maze) were tested four times with two conditions for a total of twelve trials per condition and twenty-four trials total. We found a strong effect of condition within arm one when comparing number of fish present during magnetic stimulus vs. number of fish present during sham trials (ANOVA, p<10-10). However, fish always spend significantly less time in arm one, even during sham trials. This may suggest that *K. bicirrhis* learned the location of the magnet over the course of the study. Future experiments will attempt to show a working memory of magnetic location within *K. bicirrhis* and eliminate potential for conditioning.

ANALYZING PERCEPTIONS, BELIEFS, AND CONCERNS ABOUT ALZHEIMER DISEASE IN LATINO POPULATIONS
Marissa Cortright
Neuroscience, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 465
Mentor(s): Laura Cabrera Trujillo

Latinos have a higher incidence of Alzheimer Disease (AD) compared to whites, yet they are often not diagnosed promptly or fail to receive proper care. In order to characterize the range of perceptions, beliefs, and concerns about AD, its prevention, treatment, and prediction among Latinos, we carried out an extensive search on Embase, PsychINFO, PubMed, and Web of Science for terms related to Alzheimer disease, paired with terms relating to perception, belief, and concerns. We included only articles reporting on Latino populations written in English. Our search identified 14 articles. After manually cleaning for irrelevant and duplicate articles, the final set for analysis consisted of 10 articles. We used content analysis to identify perceptions, beliefs, and concerns around AD. Our main finding was that more than half of articles (60%) found that Latinos believe that AD was a result of the normal aging process. A majority of articles (40%) mentioned different barriers to care and diagnosis of AD among Latinos, such as finances, linguistics, and transportation. A similar percentage of articles, stressed how cultural beliefs impact caregiving responsibilities, including an overarching familial obligation of caregiving and a strong aversion to nursing homes. Overall our findings show that more research is needed in this area to better target gaps in education and cultural beliefs around AD in Latino populations.

DREADD-INDUCED ACTIVATION OF DOPAMINERGIC NEURONS IN THE VENTRAL TEGMENTAL AREA
Jillian Matasovsky
Neuroscience, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 466
Mentor(s): Gina Leinninger

Dopamine (DA) neurons in the ventral tegmental area (VTA) are modulators of feeding and locomotor activity and have been implicated in the pathogenesis and potential treatment of obesity. Activating neurons that release the neuropeptide neurotensin (Nts) onto VTA DA neurons promotes energy expenditure and weight loss, presumably via activation of VTA neurotensin receptor-1 (NtsR1) neurons. My objective is to determine if activating VTA DA neurons, of which 70% express NtsR1, supports weight loss behaviors. To reach this goal, we expressed excitatory Designer Receptors Exclusively Activated by Designer Drugs (DREADDs) in VTA DA neurons, which allowed the in vivo activation of neurons by treating with a low-dose (0.006mg/kg) of the DREADD-ligand clozapine-N-oxide (CNO). This CNO treatment increased the amount of cFos (marker of depolarized neurons) specifically in VTA DA neurons compared to vehicle. We used this technique to determine if activation of VTA DA neurons is sufficient to promote weight loss behaviors in both normal weight and diet-induced obese mice. Mice were assessed for body composition and analyzed in TSE metabolic cages. Activation of VTA DA neurons does not support physical or feeding behaviors that promote weight loss in normal weight mice. Interestingly, activating VTA DA neurons in obese mice did not promote physical activity or decreased food intake, but mice still sustained weight loss. Thus, although short-term, low-dose CNO, activation of VTA DA neurons is not sufficient to promote weight loss behaviors, we speculate that selectively activating VTA NtsR1 DA neurons has the potential to modify energy balance.

FEMALE REPRODUCTIVE STATE INFLUENCES EXPRESSION OF SEROTONIN 1A, 2A, AND 2C RECEPTORS IN THE MESOLIMBIC DOPAMINE PATHWAY
Maggie Ahern
Neuroscience, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 467
Mentor(s): Joseph Lonstein, Erika Vitale

Motivation to interact with pups is important in postpartum behavior to ensure the well-being and survival of the offspring. The neurotransmitter serotonin (5-HT) is implicated in regulating this in mammals. The 5-HT system originates from cell bodies in the midbrain raphe nuclei, with the dorsal raphe (DR) providing the majority of serotonin projections to the forebrain. Serotonin modulates the mesolimbic dopamine (DA) pathway, which originates in the ventral tegmental area (VTA) and projects to the nucleus accumbens (NAc). This pathway has a well-established role in the reward system. Lesioning the VTA causes disruptions in maternal behavior and motivation, including less nesting, less nursing and more cannibalism. Because serotonin influences the mesolimbic DA system (and thereby possibly maternal behavior and motivation), the aim of the current study is to determine the expression pattern of serotonin receptors in the VTA and NAc across female reproductive states in laboratory rats. Three major 5-HT receptor subtypes were chosen for qPCR analysis: 1A, 2A, and 2C. Previous literature found that these receptor subtypes have varying expression across reproductive states in other brain regions important for maternal caregiving and emotional responding. VTA and NAc samples were collected from brains of female rats that were cycling virgins, on day 10 of pregnancy, the day of parturition, and on post-partum day 7/8. The objective is to better understand the serotonergic regulation of the mesolimbic dopamine pathway, and its influence on maternal motivation and reward, with implications for understanding the atypical neurochemistry underlying postpartum mood disorders and infant neglect.

IDENTIFYING GENES THAT REGULATE PROGENITOR CELL DIFFERENTIATION IN THE ZEBRAFISH ENTERIC NERVOUS SYSTEM
Shravani Vatti
Neuroscience, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 468
Mentor(s): Julia Ganz

The enteric nervous system (ENS) is the largest and most complex division of the peripheral nervous system. It has many significant functions including regulating motility, blood flow and secretion. Although there is much information of the function of the ENS, the regulation of ENS development is not well understood. The ENS is derived from neural crest cells, which migrate to and along the gut until the gut is completely colonized. Then ENS progenitor cells (EPCs) respond to different signals to differentiate into glial and neuronal cells. Our goal is to understand how the differentiation of EPCs into neurons and glia cells is regulated. Our hypothesis is that a set of candidate genes regulate EPC differentiation into neurons. To test this hypothesis, we analyzed the loss-of-function phenotype in the ENS of a set of candidate genes (*neurod4, onecut2, pknox1.1, pknox1.2, pbx2*) utilizing CRISPR/Cas9 genome editing technology. We injected pools of guide RNAs targeting the candidate genes as well as the *slc24a5* (*golden*) locus. Functional loss of *slc24a5* results in reduced pigmentation providing a positive visual control of injection efficiency. Injected embryos were raised to 5 days and ENS neuron number was compared in larvae with a strong *golden* phenotype to uninjected embryos. We identified a reduction in ENS neuron number in a subset of the candidate genes we tested indicating that they may regulate ENS neurogenesis. Our research will contribute to a better understanding of which genes play a role in regulating neuronal differentiation in the ENS.

DETERMINATION OF EFFECTIVE IN VIVO DELIVERY OF SGK1 INHIBITOR IN THE VTA TO STUDY ITS EFFECT ON SGK1 CATALYTIC ACTIVITY AND PHOSPHORYLATION IN DRUG-RELATED BEHAVIORS
Cole Showers
Neuroscience, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 469
Mentor(s): Michelle Mazei-Robison

Drug addiction is a psychiatric condition with increasing prevalence in the United States in recent years. Despite being a common disorder, a large amount remains unknown about the neuroadaptations that occur in drug addiction. Previously, our lab has identified a novel protein, serum and glucocorticoid-regulated kinase 1 (SGK1) that is upregulated in the ventral tegmental area (VTA) upon chronic drug administration. More specifically, we have found that SGK1

phosphorylation and catalytic activity is increased under chronic drug administration. The ventral tegmental area (VTA) is a brain region that plays a key role in drug reward behavior. Therefore, the aim of my project is to characterize if *in vivo* administration of an SGK1 inhibitor can decrease SGK1 catalytic activity and SGK1 S78 phosphorylation. We used a binge cocaine paradigm in mice, followed by direct infusion of the SGK1 inhibitor, GSK 650394, into the VTA via stereotaxic surgery. VTA was then microdissected and processed by western blotting technique to analyze changes in SGK1 S78 phosphorylation and SGK1 catalytic activity. We found no significant difference in catalytic activity levels between the GSK and control treated mice. We hypothesize that this is due to GSK having difficulty getting inside the neuronal cell, preventing GSK from inhibiting SGK1 catalytic activity. In future experiments, strategies to expand transmembrane delivery of GSK will be investigated. One potential strategy includes the use of cyclodextrin, a macrocyclic molecule made of glucose that is often utilized to increase drug delivery.

EFFECTS OF DOPAMINE D2 RECEPTOR ANTAGONISM ON EFFORTFUL DECISION MAKING
Andrew Mclocklin
Neuroscience, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 470
Mentor(s): Alexander Johnson

Dopamine and its effects are a hot topic in the psychological and neuroscience fields. Dopamine has been shown to influence learning and decision-making. We sought to determine how dopamine receptor antagonism affects decision-making when presented with a choice between a low value reward, and a high value reward that gradually requires more effort to obtain. Manipulations were done through intraperitoneal injections of haloperidol, a dopamine D2 receptor antagonist. Mice received injections of a low (0.1 mg/kg) as well as a high (0.25 mg/kg) dose of haloperidol, and performance was compared to that observed under saline control injection conditions. Mice received two tests under each of the drug conditions and the order in which they were tested was fully counterbalanced. After each injection, mice were run through an effortful decision-making task, which consisted of two levers being presented; one associated with a high value (20% sucrose solution) reward, and a second with a low value reward (5% sucrose solution). The amount of effort required to obtain the high reward increased from 1 lever response at the start of the test, to 40 responses by the end. We found that haloperidol impaired effortful discounting as well as increased omissions in a dose-dependent manner. These results confirm that dopamine plays a robust role in the maintenance of effort and decision making.

USING TRANSGENIC AND VIRAL-MEDIATED TOOLS TO EXPLORE ALTERATIONS IN BRAIN DOPAMINE PATHWAYS IN A MOUSE MODEL OF NEUROPSYCHIATRIC ILLNESS
Aura Pence
Neuroscience, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 534
Mentor(s): Ben Fry, Alexander Johnson

Altered function of the brain's dopaminergic pathways, which traffic the neurotransmitter dopamine (DA), is tied to several psychiatric disorders; most notably, schizophrenia. The positive symptoms of Schizophrenia (e.g. hallucinations, delusions, and disorganized thinking) in particular, are associated with overactive dopaminergic signaling in several brain areas critical for motivated behavior, including the ventral tegmental area (VTA) and nucleus accumbens. Here, we used a transgenic mouse model for neuropsychiatric illness known as Disrupted-In-Schizophrenia 1 (DISC-1). The DISC-1 mutation has been identified as a genetic risk factor for neuropsychiatric illness in humans; as such, we wanted to quantify how the level of DA expression in various brain regions differs when the mutant genotype is present. To do this, we crossed our DISC-1 animals with mice that selectively express Cre-recombinase within tyrosine-hydroxylase (TH; the rate-limiting enzyme for DA synthesis) cells. In these DISC-1 positive X TH-Cre mice, we unilaterally injected a Cre-mediated anterograde tract tracer, Ad-syn-mCherry into the VTA. Accordingly, only cells that express TH go through Cre-mediated recombination and thus selective expression of the tracer is observed in infected dopamine cells and terminals. This expression pattern was compared to Ad-syn-mCherry-treated TH-Cre mice that did not express the DISC-1 mutation. Differences in the brain's dopaminergic pathways between DISC-1 negative and positive mice, add further credence to the growing body of evidence that implicates DISC-1 perturbations in neuropsychiatric illness.

CHANGES IN EXTRACELLULAR NEUROTRANSMITTER LEVELS IN THE VENTRAL TEGMENTAL AREA DURING SOCIAL PLAY IN JUVENILE MALE AND FEMALE RATS
Ashley Chambers
Neuroscience, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 535
Mentor(s): Alexa Veenema, Christina Reppucci

Social play is a highly motivated and rewarding behavior that is displayed by juveniles in almost all mammals. Social play is important in the development of social, cognitive, and emotional skills. It has also been shown that those with neurodevelopmental disorders display impaired social play during childhood. The ventral tegmental area (VTA) is a brain region that has been implicated in motivation and reward, and we have recently shown that it has a critical role in the expression of social play behavior. In this study, we aimed to better understand the neurochemical changes that occur in the VTA during social play by determining how the extracellular levels of the neurotransmitters GABA, glutamate, and dopamine in the VTA are altered in response to social play in juvenile male and female rats. We conducted in vivo microdialysis by unilaterally implanting a probe with a semipermeable membrane into the VTA. During testing, probes were perfused with artificial cerebrospinal fluid (aCSF), and dialysates were collected in consecutive ten-minute intervals: 2-3 samples before play to establish baseline, 1 sample during play, and 2-3 post-play samples. The dialysates were then analyzed by liquid-chromatography-tandem mass spectrometry (LC/MS/MS) to quantify the levels of extracellular neurotransmitters present in each sample. We found that there were dynamic changes in the levels of GABA, glutamate, and dopamine in response to social play. This project can provide insight into the neural substrates of social play, so that the neural circuits affected by neurodevelopmental disorders can be better understood.

48-HOUR TREATMENT WITH THE HYPOXIA MIMETIC, DIMETHYLOXYALYL GLYCINE (DMOG), ALTERS THE SENSITIVITY OF SYNAPTIC TRANSMISSION IN THE RAT HIPPOCAMPUS TO ACUTE HYPOXIA
Anna Moody
Neuroscience, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 536
Mentor(s): Anne Slavin

Introduction: Many CNS disorders such as stroke and sleep apnea have a component of hypoxia. One of the long-term responses to hypoxia involves the stabilization of hypoxia inducible factor-1α, which can be mimicked by inhibiting prolyl hydroxyl domains (PHDs) with compounds such as dimethyloxyalyl glycine (DMOG). However, when short duration hypoxic events occur in brain regions such as the hippocampus, neurons will depress synaptic activity. In this study we have investigated the effects of 48 h treatment with the PHD inhibitor, DMOG, on hippocampal synaptic transmission. Methods: Wistar rats were injected with DMOG for 48 hours. Later, the rats were killed by decapitation and slices of the hippocampus where dissected and perfused with oxygenated ACSF. Paired stimuli were applied in both the dentate gyrus and the CA1 regions. To mimic a hypoxic event, N2/CO2 replaced O2/CO2 in the perfusing solution for 15 min, followed by a 15 min recovery period. Long-term potentiation (LTP) was induced with 3 trains of 100 pulses at 100 Hz. Results: 48 h treatment with DMOG had no significant effect on LTP. Both regions were similar in magnitude in control and treated animals. Interestingly DMOG treated rats showed an attenuation of fEPSP slope reduction to 15 min N2/CO2 perfusion in the dentate gyrus, but not the CA1 region. Conclusion: 48 h treatment with DMOG altered the sensitivity of hippocampal synaptic transmission to acute hypoxia in the dentate gyrus. These results may be important when investigating the effects of prolyl hydroxylase inhibitors in the clinic.

USING FMRI TO INVESTIGATE THE FINGER-TAPPING SPECIFIC NETWORK ACTIVITY
Sarah Flores, Jamie Satow, Savannah Tanner
Neuroscience, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 537
Mentor(s): Jie Huang

Blood-oxygen-level dependent (BOLD) functional magnetic resonance imaging (fMRI) noninvasively measures task-evoked neural activity across the whole human brain. A single fMRI voxel contains over a million neurons and its BOLD signal change reflects the task-induced changes from a pooled activity of those million neurons. The somatotopic map of the human precentral gyrus (M1) shows a one to one relationship between the body and cortical representative area. Tapping five fingers of the right-hand simultaneously should induce a BOLD signal change in the five finger

representative area of the left primary motor cortex. The temporal variation of this signal change is dynamically unitary across the whole area, forming a functional area of unitary pooled activity (FAUPA) that is specific to the five finger-tapping task. The BOLD signal time course of an identified task-associated FAUPA in left M1 can be used to identify all FAUPAs that are associated with the finger-tapping task. The primary goal of this study is to identify the right hand finger-tapping task-associated network and examine the network activity. Six right-handed, healthy 18-20 year olds who were assessed for right-handedness prior to the scan participated in this study. In order to achieve our goal, we designed a task paradigm where subjects were asked to tap their right five fingers simultaneously for different amounts of time. Functional MRI images were acquired during the subjects performance of the task and will be analyzed to find the task-associated network and BOLD signal variation. Results will be reported.

SEX-SPECIFIC EFFECTS OF STRESS: DELTA-FOSB AND ITS ROLE IN THE DEVELOPMENT OF DEPRESSION
Sadhana Chinnusamy
Neuroscience, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 538
Mentor(s): Alfred Robison, Claire Manning

Women represent the majority of patients affected by depression, but preclinical studies, such as rodent stress models, have historically used male animals and ignored sex differences in depression-like behaviors (Iñiquez et al, 2017). A newer method, the sub-chronic variable stress (SCVS) paradigm, induces depressive-like behaviors specifically in female mice (Brancato et al, 2017), allowing us to test the molecular mechanisms driving sex differences in mood disorders. In the brain, the ventral hippocampus (vHPC), a region involved in learning and memory, sends neuronal projections to the nucleus accumbens (NAc), a major component of the reward pathway, and the basolateral amygdala (BLA), which regulates fear and anxiety behaviors. In the NAc, expression of the transcription factor ΔFosB, which accumulates after chronic stimulation, is necessary for resilience to stress-induced depression-like behavior (Vialou et al, 2010). We know that heightened activity of vHPC neurons directly projecting to NAc drives stress-induced behaviors in males (Bagot et al, 2015), and we thus hypothesized that ΔFosB in vHPC-NAc projecting neurons promotes resilience to stress. Therefore, we used the SCVS model to induce stress in both male and female mice, and as expected, only female mice developed anhedonia, as measured reduced preference for sucrose solution over water. We then used immunohistochemistry and Western Blotting to measure ΔFosB induction in vHPC-NAc and vHPC-BLA neurons. We predict differences in ΔFosB induction in these pathways between stressed and non-stressed animals and between sexes. This study will provide insight into the molecular etiology of depression, as well as the potential for uncovering sex-specific treatments for mood disorders in the future.

THE LATERAL HYPOTHALAMUS FEEDING SIGNAL MELANIN CONCENTRATING HORMONE INFLUENCES PERFORMANCE IN AN INTERVAL TIMING TASK IN FEMALE BUT NOT MALE RATS
Anvita Suneja
Neuroscience, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 539
Mentor(s): Alexander Johnson, Lauren Raycraft

Feeding behaviors have traditionally been studied within a context of circadian timing (i.e., timing 24 hrs); however, interval timing (i.e., timing in milliseconds to minutes range) may play a central role, as this distinct form of timing is critical for learning and decision-making, including food-related choices. Notably, no studies have examined signals controlling appetite regulation on interval timing. In this study, we examined the lateral hypothalamic (LH) peptide Melanin concentrating hormone (MCH), which is known to contribute to the regulation of feeding behavior. Male and female Sprague Dawley rats first received targeted LH injections of an MCH-specific DREADD virus, which permitted activation of LH MCH cells when rats were treated with clozapine-N-oxide (CNO). Following recovery from surgery, rats were trained on the peak interval paradigm, which involved first learning to respond on a lever for sucrose reward following a 20 s target criterion. Next, intermixed probe trials were introduced during which the lever was extended but no sucrose was provided. Under control conditions, during probe trials all rats showed intact temporal performance, as revealed by a normal distribution that peaked near the 20 s criterion duration. Following CNO infused into the lateral ventricle, MCH stimulation had no effect on normalized temporal response functions in males. However, in females CNO-induced MCH stimulation selectively modified responding on the right-hand side of the curve, an effect that was dependent on stage of estrous cycle. Collectively, these findings suggest a sex-differentiation effect of MCH stimulation on this interval timing task.

EXAMINING TLR2 MEDIATED CHANGES IN NEURONAL MODELS OF ALZHEIMER'S DISEASE
Megan Dykstra
Neuroscience, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 540
Mentor(s): Anne Slavin

Alzheimer's disease is the most common form of dementia, a progressive neurodegenerative disorder characterized by various pathological markers, including neuroinflammation. The resident immune cell of the brain, Microglia, become chronically activated during the aging process. Toll like receptors on these cells are activated, and account for much of the inflammation observed in this condition. In this study we wished to assess the effects of the TLR2 agonist, lipoteichoic acid (LTA) on three cell types, one that represented cells from a healthy brain, and two that mimicked neurons with an Alzheimer's disease-like phenotype. Current treatments for AD are variable in their effectiveness among the population, and at best can alleviate some of the symptoms. Therefore, we examined the therapeutic potential of cannabidiol (CBD), which has been widely reported to exert anti-inflammatory properties. Results suggest that cellular expression of Aβ42 regulates the proliferation and differentiation of neuronal cells. We concluded that LTA induces inflammatory effects in neurons which appear more profound in cells expressing the AD phenotype. Additionally, CBD alleviated the LTA-induced increase in nitrite release in the AD-model cells.

EXAMINING ACTIVITY-DEPENDENT CHANGES IN LATERAL HYPOTHALAMIC CELLS FROM MICE MAINTAINED ON A HIGH FAT DIET AND TESTED FOR FEEDING IN THE ABSENCE OF HUNGER
Matthew Bunney
Neuroscience, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 604
Mentor(s): Alexander Johnson

As the prevalence of obesity continues to rise, its associated co-morbidities, such as diabetes mellitus and metabolic syndrome, pose a significant risk to our health and well-being. Environments characterized by an abundance of high fat, high sugar foods and food-related stimuli (e.g., the McDonald's Golden Arches™) promote obesity through an imbalance of energy intake and expenditure. The repeated presentation of highly palatable foods with environmental cues may lead these cues to become associated with food delivery and promote feeding in the absence of hunger. In addition, exposure to a high fat diet (HFD) may increase individual susceptibility to these types of food-related cues. Here, we examined in mice whether exposure to a HFD affects both cue-evoked feeding in the absence of hunger (i.e., cue-potentiated feeding), and the expression of cells in the lateral hypothalamus that produce the feeding peptides, Melanin Concentrating Hormone (MCH) and Orexin (ORX). Understanding how HFD affects cue-potentiated feeding and disrupts the signaling of feeding peptides within the brain will provide substantial insights, including how we approach and treat obesity in the obesogenic current environment.

COMPARISON AND VALIDATION OF TWO GONADOTROPIN-RELEASING HORMONE-PROMOTER DRIVEN CRE EXPRESSING MICE
Brooke Devries
Neuroscience, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 605
Mentor(s): Hanne Hoffmann

A main technical advancement allowing us to understand a gene's role within a specific cell population is conditional knock-out mice. This approach allows a DNA fragment flanked by a "loxP" sequence to be recombined by the CRE recombinase, conditionally deleting the gene within the CRE expressing cells. The major limit of this system is the lack of fidelity of CRE expression. Our goal was to validate the specificity of two different cre-expressing mice which have CRE expressed in a neuronal population required for fertility, the gonadotropin-releasing hormone (Gnrh or Lhrh) neurons. We will refer to these mice as Gnrh-cre and Lhrh-cre. To determine if the CRE expression pattern was comparable in development in Gnrh-cre and Lhrh-cre embryos, we performed immunohistochemistry for CRE at different developmental ages. We found that after embryonic day 12.5 (E12.5) more cells expressed CRE in the Gnrh-cre than in the Lhrh-cre embryos, a pattern maintained into adulthood. These findings were confirmed by crossing the Gnrh-cre and Lhrh-cre mice with the "tracer" mouse Rosa26-LacZ, allowing LacZ labeling in all cells expressing CRE. To validate the specific targeting of Gnrh-cre and Lhrh-cre to GnRH neurons we performed double-IHC for CRE and GnRH. We found that both Gnrh-cre and Lhrh-cre targeted GnRH neurons, but the Gnrh-cre caused CRE expression in an

extensive number of cells not expressing GnRH. In conclusion, we determined that the Gnrh-cre mouse expresses CRE in many cells not expressing GnRH, and therefore recommend using Lhrh-cre which specifically and efficiently targets GnRH neurons.

INVESTIGATING THE ROLE OF CANDIDATE GENES IN REGULATING NEURONAL DIFFERENTIATION IN THE ZEBRAFISH ENTERIC NERVOUS SYSTEM
Nora Straquadine
Neuroscience, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 606
Mentor(s): Julia Ganz, Ann Davidson

Neurogenesis is the development and growth of nervous tissues. Our work focuses on how neurogenesis is regulated in the enteric nervous system (ENS), which is the network of neurons that innervate the gut and regulates important gut functions, such as gut motility. While we know what functions the ENS carries out, there is still a significant gap in knowledge as to how the development of the ENS is regulated. In this project, we aim to identify genes that are important for the differentiation of stem cells into neurons using zebrafish as model system. Our hypothesis is that a set of candidate genes (*phox2a, foxn3, dlx1a, jarid2a,* and *jarid2b*) regulate ENS neurogenesis. To test their role, we used CRISPR/Cas9 genome editing approaches to generate loss-of-function mutations in these candidate genes. We injected gRNAs targeting pools of candidate genes together with Cas9 protein into one-cell stage zebrafish embryos. For a positive visual control of the injection efficiency, the *slc24a5 (golden)* locus was also targeted. Functional loss of *slc24a5* allowed for visual screening of reduced pigmentation at 2 days post fertilization (dpf). Injected embryos were raised to 5 dpf and ENS neuron number was compared in larvae with a strong *golden* phenotype compared to uninjected embryos. We identified a reduction in ENS neuron number in a subset of the candidate genes we tested indicating that they may influence enteric stem cell differentiation into ENS neurons. Our work will contribute to a better understanding of how ENS neurogenesis is regulated during development.

IS PAIN ASSOCIATED WITH NERVE INFLAMMATION IN GUILLAIN-BARRE SYNDROME?
Joe Faryean
Neuroscience, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 607
Mentor(s): Linda Mansfield

Guillain Barré Syndrome (GBS) is the leading cause of acute paralysis in the U.S. This illness is characterized by ascending limb paralysis. NOD CD-86$^{-/-}$ mice have been found to develop Spontaneous Autoimmune Peripheral Polyneuropathy (SAPP) after 20 weeks of age. Previous work determined that SAPP closely mirrors the Acute Inflammatory Demyelinating Polyneuropathy (AIDP) form of GBS and that these inbred mice with SAPP can serve as a good model for the study of GBS. Mice that developed SAPP had increased inflammation in their peripheral nerves. We hypothesize that NOD CD86$^{-/-}$ mice that displayed signs of pain will have increased inflammation in their peripheral nerves compared to the control groups. To test our hypothesis, we had two groups of mice: NOD WT and NOD CD86$^{-/-}$ The NOD WT and NOD CD86$^{-/-}$ mice were put through the open field test and their performance recorded on a camcorder for two to three minutes. These videos were analyzed using the Mouse Grimace Scale to determine pain levels. The mice were humanely euthanized, they were necropsied and their brachial plexus, dorsal root ganglion, and sciatic nerve were sectioned and stained with anti-CD3 and anti-F4/80 antibodies to detect T cells and macrophages, respectively. Nerve sections were analyzed using morphometry to determine levels of inflammation. We found increase infiltration of T lymphocytes and macrophages in the peripheral nerves of NOD CD86$^{-/-}$ mice when compared to NOD WT mice. Results of the study indicate a correlation between pain phenotypes and increased inflammation in NOD CD86$^{-/-}$ mice.

READING THE READING BRAIN: INTERPRETING CHANGES IN BRAIN ACTIVITY DURING NATURAL READING USING FMRI
Benjamin Horne, Addison Wood, Derrick Dwamena, Kumaran Arivoli, Daniel Seong, Aneeqa Hasan
Neuroscience, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 608
Mentor(s): Natalie Phillips

Literary neuroscience, an emerging interdisciplinary field, balances techniques from the fields of cognitive studies and the humanities to better understand reading and language processing. Our study is particularly interested in exploring the neural processes of reading that occur across different degrees of attention. We prompted participating English Ph.D students to read through the second chapter of Jane Austen's Mansfield Park while alternating between two different reading styles: close (analytical) reading and pleasure (casual) reading. Many contemporary researchers are interested in observing the neural processes associated with reading, but past experiments merely present single words or sentences as their stimuli?hardly a replication of real-world reading. Our research, however, allowed participants to read naturally as our stimulus presented entire paragraphs of prose and allowed readers to proceed through the stimuli at their own pace. While participants read, fMRI measured participants' blood-oxygenation-level dependent (BOLD) signal. After the scan, participants wrote literary essays on sections they close read in the scanner. Using the BOLD data, we isolated peak neural activity in various regions of the brain such as the medial temporal gyrus, supplementary motor area, and the visual cortex?regions responsible for word processing, movement planning, and visual processing, respectively. We hypothesize that participants will exhibit heightened activation in these regions while close reading when compared to pleasure reading. By viewing the neural processes associated with reading naturally-presented prose, we can more effectively understand the cognitive processes involved in both analytical and casual reading.

SEX-SPECIFIC REGULATION OF JUVENILE SOCIAL PLAY BY OXYTOCIN IN THE NUCLEUS ACCUMBENS
Ann Scazzero
Neuroscience, Poster Presentation
Section: 4, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 610
Mentor(s): Alexa Veenema, Remco Bredewold

Social play is important for the development of normal social behavior in juvenile mammals. Social play deficits are seen in autism spectrum disorder (ASD) and schizophrenia. The neuropeptide oxytocin (OT) is currently being tested in clinical trials to help normalize social behavior in patients with ASD and schizophrenia. We aimed to better understand how OT modulates social play in male and female juvenile rats. We focused on OT in the nucleus accumbens (NAcc), a brain region important for social behavior. Social play was measured by exposing single-housed juvenile male and female rats in their home cage to an unfamiliar age- and sex-matched rat for 10 minutes. We found that injecting the specific OT receptor (OTR) antagonist des-Gly-$NH_{2,}$d$(CH_2)_5$[Tyr(Me^2),Thr^4]OVT into the NAcc significantly decreased the duration of social play in both sexes, but required a higher dose of the OTR antagonist in males. This suggests that OT in the NAcc facilitates social play in both sexes, but that males may require higher OTR activation than females. We are currently using microdialysis to determine the effects of the OTR antagonist on changes in neurotransmitter release in the NAcc while rats are exposed to social play. We also plan to use receptor autoradiography to determine whether there are sex differences in OTR expression in the NAcc of juvenile rats. These experiments may provide insights into the mechanisms by which OT in the NAcc facilitates social play in sex-specific ways, with applications for social play deficits and sex-biases seen in ASD and schizophrenia.

ROLE OF LATERAL HYPOTHALAMIC NEUROTENSIN NEURONS IN MODULATING CALORIC AND NON-CALORIC FLUID INTAKE
Nandan Kodur
Neuroscience, Oral Presentation
Section: 5, 1:30 PM, MSU Room
Presentation Number: 821
Mentor(s): Gina Leinninger

Both energy and fluid balance are disrupted in obesity-linked type-2 diabetes (T2D): excess food consumption causes adiposity, and insufficient water intake leads to dehydration and life-threatening diabetic complications. Yet an incomplete understanding of how the brain organizes ingestive behaviors has deterred recognition of targets to optimally modulate *both* behaviors to treat this disease. The Leinninger lab has characterized neurotensin-expressing neurons of the lateral hypothalamic area of the brain (LHA^{Nts} neurons) that promote water intake but attenuate feeding

– the ideal dual behaviors needed to treat obesity-T2D. While activating LHA^{Nts} neurons causes mice to drink any water-based solution provided to them, they prefer neutral or sucrose solutions to bitter or hypertonic solutions. These data raise a translational conundrum, as increased caloric intake from liquids could countermand the reduced feeding and weight loss. However, augmenting intake with palatable, non-caloric beverages could improve fluid balance without increasing caloric load. We hypothesize that activating LHA^{Nts} neurons in mice will invoke preference for any palatable liquid, regardless of its caloric content. To investigate this hypothesis, we use Designer Receptors Exclusively Activated by Designer Drugs (DREADDs) to selectively activate LHA^{Nts} neurons during two-bottle preference tests. In each test, mice have access to water and one other liquid: either 1% sucrose (palatable and carbohydrate-rich), a 1:1 dilution of Ensure (palatable mix of carbohydrate and fat) or 0.1% saccharine (palatable but non-caloric). The translational relevance is, augmenting consumption with non-caloric fluid intake, concomitant with suppressed feeding, could promote optimal hydration and caloric reduction – necessities in treating obesity-T2D.

COMPARING RIGHT AND LEFT-HAND FINGER TAPPING SPECIFIC NETWORKS IN THE BRAIN
Sean Evers, Destiny Williams, Chayanne Petit
Neuroscience, Oral Presentation
Section: 5, 1:45 PM, MSU Room
Presentation Number: 822
Mentor(s): Jie Huang

In the motor cortex, there is a one to one relationship between different parts of the body and their respective areas in the brain. Accordingly, each finger has its own representative area in the primary motor cortex. Tapping a finger causes a task-induced blood oxygenation level dependent (BOLD) signal change in the finger representative area which can be detected using functional magnetic resonance imaging (fMRI). By tapping every finger quickly and in random order, we are able to detect a functional area of unitary pooled activity (FAUPA) associated with the finger tapping task. A FAUPA is defined as an area in the brain where the temporal variation of an activity is the same across the entire area; for any two locations within the FAUPA, the temporal variation of the BOLD response is the same. The BOLD signal time course of an identified task-associated FAUPA in the primary motor cortex can be used to identify all FAUPAs that are associated with the finger-tapping Task. This study uses BOLD fMRI to identify and compare networks of task-associated FAUPAs between the right and left hand. Six right handed subjects, ages 18 - 20, were given the task of tapping their fingers on both their right and left hands and functional images of their brain were acquired. The data will be used to compare the networks of task-associated FAUPAs between the subjects' right, or dominant hand, with their left, or non-dominant hand.

SERUM GLUCOCORTICOID REGULATED KINASE 1 ACTIVITY REDUCES DENDRITIC SPINES IN DORSAL HIPPOCAMPUS
Emily Steffke
Neuroscience, Oral Presentation
Section: 5, 2:00 PM, MSU Room
Presentation Number: 823
Mentor(s): Alfred Robison, Michelle Mazei-Robison

Memory formation is a complex neurobiological process involving the modification of synapses. Such neuroplasticity can be regulated by alterations indendritic spines. Altering hippocampal spine morphology can therefore induce changes in synaptic connectivity associated with learning and memory in various disease states, including depression and addiction. It is therefore necessary to understand the factors that affect synaptic remodeling. The protein Serum/glucocorticoid-dependent kinase (SGK1) is known to be regulated by cocaine and stress, and involved in spatial memory. Thus, changes in SGK1 expression may mediate alterations in dendritic spines and synaptic connectivity. I examined how altering hippocampal SGK1 activity can affect the dendritic spine morphology in the hippocampus. I injected mice with one of three viruses: green fluorescent protein (GFP) alone; GFP+wild-type-SGK1; or GFP+K127Q-SGK1, a catalytically inactive version of the protein. Mice were then sacrificed and confocal fluorescent microscopy was used to visualize dendritic spines. Using NeuronStudio software, I quantified the number and morphology of spines in the virally transduced cells. I found that decreasing SGK1 activity (K127Q-SGK1) in the CA1 region increased the total number of dendritic spines compared to GFP-only controls, driven by a significant increase in mushroom and stubby spines. As mushroom spines indicate strengthened excitatory input, these data suggest inhibiting SGK1 may increase the strength of excitatory input onto CA1 neurons, and thus that SGK1 normally dampens these inputs. As the formation of mature synapses is a crucial component of learning and memory, this indicates SGK1 mediate alterations in learning and memory in disease states.

VALIDATION OF VTA SGK1 KNOCKOUT MICE FOR USE IN MORPHINE NEUROADAPTATION STUDIES
Ali Stark
Neuroscience, Oral Presentation
Section: 5, 2:15 PM, MSU Room
Presentation Number: 824
Mentor(s): Michelle Mazei-Robison, Marie Doyle

According to the National Institute on Drug Abuse, over 40,000 people per year die of an opioid overdose. Opiate abuse in part results from neuroadaptations in the ventral tegmental area (VTA), and our lab previously demonstrated that chronic morphine exposure increases catalytic activity of the protein serum- and glucocorticoid-regulated kinase 1 (SGK1). However, as the VTA is composed of ~60% dopaminergic (DA) neurons and ~35% GABAergic neurons, the neuronal cell type of interest remains unknown. To answer this question, we are using novel mouse models with cell type-specific manipulations of SGK1. To determine the effect of SGK1 gene knockout in DA neurons, I am isolating VTA RNA from mice with a transgenic knockout of SGK1 from all DA neurons (FlxSGK1xDAT-Cre). Following qPCR to analyze SGK1 mRNA levels, we predict reduced expression in DA KO mice than in controls. To create a VTA- and cell type-specific manipulation of SGK1, I will validate a Cre-dependent virus which overexpresses a catalytically inactive version of SGK1 (AAV-DIO-SGK1-K127Q). This virus will be injected into the VTA of mice which express Cre recombinase in either DA (DAT-Cre) or GABA neurons (VGAT-Cre). I will validate viral expression using immunohistochemistry in VGAT-Cre mice and function using Western Blotting for SGK1 catalytic activity in both VGAT-Cre and DAT-Cre mice. We predict that K127Q overexpression mice will show a decrease in SGK1 catalytic activity compared to GFP controls. After validation of these models, mice will undergo the morphine two-bottle choice test to assess VTA SGK1 manipulation on drug reward behavior.

SEX DIFFERENCES IN INTRAVENOUS RT-PA THROMBOLYSIS TREATMENT FOR ACUTE ISCHEMIC STROKE: AN UPDATED META-ANALYSIS
Brent Strong
Neuroscience, Oral Presentation
Section: 5, 2:30 PM, MSU Room
Presentation Number: 825
Mentor(s): Mathew Reeves

A meta-analysis published in 2009 reported that women were 30% less likely to receive IV rt-PA treatment for stroke than men. We updated this meta-analysis to determine if this sex disparity still existed. We identified studies that reported sex-specific IV rt-PA treatment rates for acute stroke published between April 2008 and October 2017. Eligible studies included representative populations of acute stroke admissions with data obtained from individual or multiple hospitals, registries, or administrative databases. Random effects odds ratios (OR) and 95% confidence intervals (CI) were generated to quantify sex differences (females vs. males) among all ischemic stroke admissions and among relevant subgroups. A total of 25 eligible studies were identified. The summary unadjusted OR based on 17 studies was 0.87 (95% CI =0.82-0.93) indicating that women had a 13% lower odds of receiving rt-PA treatment than men. However, substantial between-study variability existed. Lower treatment rates in women were also observed in the 8 studies that provided data on patients eligible for IV rt-PA treatment based on time of arrival and lack of contraindications; the summary OR was 0.93 (95% CI= 0.87-0.99). Examination of time trends across studies published between 2000 and 2018 found evidence that the sex difference was smaller in those studies published in the last 10 years. Although there is significant variability in the findings of individual studies, the preponderance of data from more recently published studies still shows that women with acute stroke are less likely to be treated with thrombolysis compared with men.

PHYSICAL SCIENCES

TOTAL ABSORBANCE SPECTROSCOPY AND KILONOVAS
Shannon Wicklund
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 372
Mentor(s): Artemisia Spyrou

Beta-decay values are used for studies on heavier and neutron-rich unstable elements and nuclear structures. Because of the importance and necessity of beta-decay values for these areas of study, we want the values to be as accurate as possible. If they prove to be inaccurate this can lead to false information in these fields and potential decades of investigation wasted on trying to correlate false values to their study. The way to get more accurate beta-decay values far heavier more unstable elements is to use the Total absorbance spectroscopy method (TAS). Total absorbance spectroscopy is more accurate than previous germanium detectors, GE, because it avoids the problem of the pandemonium effect. This occurs when detectors have good energy resolution but are bad in efficiency. This causes some low intensity gamma rays to be undetected which enhances the beta-decay feeding distribution at lower excitation energies. TAS bypassing this provides accurate beta-decay feeding distributions. This is important for the study of astrophysical sites, kilonavas, for the r-process elements, heavier neutron-rich elements that are far from stability. The beta decay feeding intensity tells exactly how much available energy will be emitted by gamma rays which contribute to the light we see from a kilonova. It also tells us how much will be emitted by beta-particles, electrons, that get absorbed by the star which is unable to be seen. Having TAS gives us a better insight on how astrophysical events work and contribute to different beta-decay processes and nuclear structures.

NITRATE DYNAMICS DURING STORM EVENTS IN ARCTIC WATERSHEDS WITH VARYING LANDSCAPES
Megan Duda
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 373
Mentor(s): Jay Zarnetske, Arial Shogren

Rapid climate change and intensified precipitation regimes are introducing ancient organic and inorganic nutrients from Arctic permafrost into modern biogeochemical cycles. An increase in nitrogen (N) export has been observed in most permafrost-underlain rivers, suggesting that nutrient loss from terrestrial environments is increasing. Riverine nitrogen loss may exacerbate terrestrial N-limitation and stimulate primary-productivity in the Arctic Ocean, though the cause for increasing export is not well understood. To fill this knowledge gap, we used concentration-discharge (C-Q) relationships to investigate nitrogen (as nitrate, NO3-) behavior during high-flow events. We used high-frequency data collected during the 2017 summer season in three distinct watersheds associated with the Arctic Long-Term Ecological Research (LTER) Toolik Field Station: the Kuparuk (low-gradient tundra), Oksrukyuik (lake-dominated tundra), and Trevor Creek (high-gradient alpine). Generally, we found C-Q patterns indicative of NO3- dilution during storm events, with lower concentrations during the peak of Q. However, the shape and loop direction of these patterns differed by watershed. For example, in the homogenous tundra Kuparuk, C-Q relationships were generally clockwise, suggesting rapid NO3- release from a close landscape source. In contrast, in the lake-dominated Oksrukyuik, C-Q relationships switched between clockwise and counter-clockwise; counter-clockwise C-Q may occur when sources are either distant from the sampling location or when sources are activated later in the event. Our study revealed that the majority of storm events dilute the river NO3- signal, and provides insight on what frozen permafrost stores under varying Arctic landscapes may have on future N-budgets.

ERRORS AND GEOLOGIC WORKING MEMORY
Felix Ishimwe, Kelsi Broich
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 374
Mentor(s): Julie Libarkin

Longstanding studies into the nature of expertise have identified important hypotheses about the role of working memory capacity in building expert behavior. In some studies, working memory is directly tied to expert performance, with greater working memory producing more expert-like behaviors. In other work, including with geoscientists, experts are able to circumvent their limitations and develop work-arounds to expert behavior that are not strongly correlated to

working memory. In addition to memory capacity, the role of precision in working memory suggests that the presence of errors in recalled information may be a more precise measure of working memory capacity than simple recall. In addition, both the type and rate of errors present in recalled information are also correlated to expertise. In a study of visuospatial working memory capacity, novices and experts were asked to view block diagrams and draw these diagrams from memory. Two types of diagrams, containing either geologically plausible or implausible scenarios, were used. Differences in precision and error types between novices and experts, as well as between block type, indicate the presence of important nuances in how geologic information is encoded and retrieved by different groups. This work provides insight into the nature of internal visual representations as well as potential for recall errors during complex tasks.

ANALYSIS OF STAR FORMATION HISTORY OF NOVAE IN ANDROMEDA GALAXY
Hazirah Sanani
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 375
Mentor(s): Sumit Kumar Sarbadhicary

Novae are explosions from the surface of a white-dwarf star in a binary star system that is one of the most spectacular objects produced by stellar evolution. We investigate the Star Formation History of the novae in Andromeda Galaxy to know the age group of the white dwarf and the companion. We made a hypothesis that the older the star is, the probability of finding the star in the cells using Delay-Time Distribution (DTD) would be higher. We took the data gained from Optical Novae in M31 from Max Planck Institute for Extraterrestrial Physics (MPE) and Stellar Age Distribution (SAD) from Panchromatic Hubble Andromeda Treasury (PHAT) as input for our research. By using DTD method, we solve the number of Novae expected in each spatial cell i of the SAD map, λ_i (i = 1 ...K) which is the product of the discretized SAD in the cell ($m_{i,j,}$ the stellar mass formed during time interval j, with j = 1 ...M) and the discretized DTD (Ψ_j, novae per unit time per stellar mass formed). Then we plot the DTD as a function of Age. We found that most novae are occupied at the bulge of the galaxy. We also discovered the correlation between the median magnitude of the novae and the age of novae.

A LABORATORY ANALYSIS OF CHEMICAL GRADIENTS AT THE LOST CITY HYDROTHERMAL FIELD
Dylan Mankel
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 376
Mentor(s): Matthew Schrenk

The possibility of life on icy-moons such as Europa and Enceladus has drawn attention to studying the nature of extreme environments. However, evidence for life on these moons has yet to be shown in the data collected during the *Cassini* probe flybys. The chemistry of these places are what characterize the life therein, so studies of similar environments here on Earth provide insight into what we might find on these rocky bodies. The Lost City hydrothermal field (LCHF) is of particular interest because it is a site of relatively low-temperature serpentinization reactions that produce necessary nutrients to support submarine life. Here we show laboratory experiments that can model the chemistry associated with the hydrothermal vents at LCHF in the presence of microbe-mineral and microbe-microbe interactions. Chimney samples that were collected during an expedition to LCHF in 2018 were inoculated in appropriate broths and gradients that would be analogous to the site's geochemistry to further isolate the individual species seen in the microbial community, a task that has yet to be demonstrated, and were reinoculated into Enceladus-like environments that are associated with the plumes and the expected submarine environment derived by current models. The fortran-based reactive transport code, Crunchflow, was also used to asses the conditions under which those organisms were able to grow along the gradients. These experiments can help to discern the influence of biology on the geochemistry of LCHF and could be extended to other chemistries and conditions, particularly those of Europa and Enceladus.

CAN THE CHEMICAL SIGNATURES OF PAINTS BE INCRIMINATING EVIDENCE?
Emily Loder
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 377
Mentor(s): Carl Boehlert, Per Askeland

Everything at a crime scene can be considered evidence, down to the smallest paint chip. If that chip matches the chemical makeup as paint that a suspect owns, and was using close to the time of a crime, it could be used as incriminating evidence in court. Using a scanning electron microscope, it is possible to analyze the chemical makeup of a paint chip, as well as examine the edges to possibly assess if the chip came off of a certain object. The goal of this experiment is to see the chemical makeup of different types of paint that are all the same color, and determine why two paints of the same color may have different chemical makeup. For example, would white ceiling paint have a different makeup as white wall paint which could have a different makeup to white car paint. And to further see if the same color paint between different brands would have different makeup based on the quality of the paint. These techniques could be used to determine the type, possibly the brand of paint found at a crime scene and would allow investigators to confirm or rule out suspects based on the chemical signature of paint that may have been used by said suspects.

DETECTING RADIATION DURING ISOTOPE HARVESTING
Katerina Kitsios, Chloe Kleinfeldt
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 378
Mentor(s): Gregory Severin

Isotope harvesting is the chemical methodology used to extract many uncommon radionuclides that are discarded from accelerator facilities. The research and design developed by the Isotope Harvesting Group at the National Superconducting Cyclotron Laboratory/Facility for Rare Isotope Beams (NSCL/FRIB) confirmed in December 2018 that such harvesting is plausible from accelerator cooling water through a series of aqueous and gaseous traps. These traps separate radioisotopes from the cooling water and allow them to be used in applied science research. In order to determine whether radioactive materials were located in specific areas of the trapping system and to ensure proper operation, gamma-ray detectors were installed to monitor the aqueous and gaseous chemistry equipment. Gamma-rays from radioactive substances hit the detectors, in this case, cesium fluoride crystals, and the rate of hits was used to determine the quantity of radionuclides at the monitored locations. However, the detectors were too sensitive to background gamma-rays and neutrons from the accelerator. As a result, the detectors mainly indicated when the beam was on or off, not where the radioactivity actually was. Therefore, these detectors did not provide accurate measurements. Future experiments will consist of new detectors, specifically PIN diodes and a germanium detector, which are less sensitive to the background signal. Once the isotope harvesting process is fully developed and understood, harvesting will occur at the facilities as a routine process. Isotope harvesting has numerous applications in biology, medicine and pharmaceuticals, engineering, and national security, as well as multiple other fields.

ELECTROACTIVATED ALKYLATION OF AMINES WITH ALCOHOLS VIA BORROWING HYDROGEN METHODOLOGY
Gabriela Keeney
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 442
Mentor(s): Benjamin Appiagyei

The chemical and medicinal industry have employed C-H activation as a powerful tool in synthesizing medicines, industrial materials and natural products and has the potential to revolutionize organic chemical industries.[1] In this work, C-H bonds adjacent to -OH or -NH_2 groups can be electrochemically activated over catalytic electrodes and can be tracked by H/D exchange studies.[1] Through these deuteration studies we uncovered a mild, electrocatalytic method for alkylating amines with alcohols. Methanol, primary, secondary, and bulkier alcohols such as cyclohexanol and benzyl alcohols all readily alkylate simple secondary amines such as pyrrolidine. Via alkylation of ammonia, lab staples triethylamine and *N,N*-diethylbutylamine are easily made from the corresponding alcohols. For many years, these class of compound is achieved via classical methods such as reduction of amides and nitriles, reductive alkylation with corresponding carbonyl species, and electrophilic SN_2 alkylation with alkyl halides. These conventional methods have been improved over the years, however they suffered from several disadvantages: (a) the use of alkyl halides or strong reducing agent which are less benign to the environment, (b) the generation of equimolar mixture of wasteful salt as

byproduct and (c) lack of selectivity which leads the formation of quaternary ammonium ions. Many active chemicals, pharmaceuticals, herbicides, conducting polymers and components of organic diodes contain alkylamines. Electroactivated reductive alkylation of amines with alcohol and water as solvent provides a new and a more benign approach for the synthesis of alkylamines.

GADGET SYSTEM FOR NUCLEAR ASTROPHYSICS: GAMMA-RAY DATA ANALYSIS
Molly Janasik
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 443
Mentor(s): Christopher Wrede

We are investigating scientific questions about nuclear astrophysics, such as nucleosynthesis and energy generation in stars and exploding stars. Nuclear physics experiments are needed in order to answer these questions, so we have recently commissioned the experimental Gas Amplifier Detector with Germanium Tagging (GADGET) system at NSCL/FRIB. GADGET is comprised of a custom-made Proton Detector and the existing Segmented Germanium Array (SeGA), which measure protons and gamma rays (respectively) emitted following gamma-decay. The purpose of the experiment was to test the system's performance using a radioactive ^{25}Si beam and this has proven to be successful in both low-background, low-energy beta delayed proton detection, and proton-gamma coincidences. A detailed analysis is currently being done on the SeGA data to extract the energies and intensities from the gamma-ray peaks. This information will be used to search for new transitions and improve the decay scheme of ^{25}Si.

CHARACTERIZATION OF MULTIPLE INTERACTION EVENTS IN AN INORGANIC SCINTILLATOR
Patrick Johns
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 444
Mentor(s): Sean Liddick

Understanding how a nucleus is put together is a key question in nuclear science which require the production of rare isotopes and the study of their decay modes. One such decay mode is beta decay where a neutron is converted into a proton and an electron and electron antineutrino are emitted, along with some excess energy. The beta-decay process typically leaves the resulting nucleus in an excited state and delayed radiations are emitted. The delayed emissions could include photons, neutrons or electrons. A wealth of information is obtained in the case of beta-delayed electron emission however, such a process is experimentally difficult to observe entailing observing two electrons being emitted from a single point in space and possibly time. To search for these types of decays, rare isotopes are placed into a scintillating crystal on top of a light sensitive detector which contains a 16X16 grid. Differentiating between single and double electron emission in the detector could be feasible using a machine learning algorithm but to apply it to experimental data requires a labeled training data set that have been confirmed to include multiple electron emission events. Once the machine learning algorithm is properly trained, it will be able to confidently separate double pulses on large scale data sets so that properties of this rare decay can properly be determined and explored. I will present the work on obtaining experimentally labeled multiple electron events.

SEARCHING FOR SHOCKS IN NOVAE FROM HARD X-RAY EMISSION
Alexa Muethel
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 445
Mentor(s): Laura Chomiuk

Novae are thermonuclear runaways on the surface of white dwarf stars. With the recent detection of gamma-ray emission from novae, it has been discovered that shocks and the accompanying hard X-ray emission from these explosions are very important. However, these shocks are not well-understood. In order to better understand the mechanisms of shocks and the role of hard X-ray emission, we are conducting a survey of novae that have shown emission in X-ray wavelengths. We present an analysis of X-ray light curves with data taken by the Swift X-Ray Telescope over the last 20 years. This unprecedentedly large sample size allows us to look for population trends with the goal of understanding the role of hard X-ray emission in novae.

EARLY CENOZOIC MAGMATISM IN EAST AFRICA: EXPANDING THE EOCENE AMARO AND GAMO BASALTS
Rayn Phillips
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 446
Mentor(s): Tyrone Rooney

Magmatic activity in the East African Large Igneous Province (LIP) is characterized by two magmatic pulses: (A) an initial Eocene phase (ca. 45 to 35 Ma) centered on Southern Ethiopia and, (B) a subsequent Oligocene phase (ca. 32-28 Ma) centered on the northwest Ethiopian Plateau. The Eocene phase has attracted little scientific attention, despite it representing about 20% of the magmatic flux. Prior studies divided magmatism into a lower Amaro and upper Gamo lava series; however, these studies consisted of only three stratigraphic sections located along the margin of the Main Ethiopian Rift. Critically, these studies have not linked the mapped units with the geochemically defined groups. In our previous study, we collected major and trace element geochemical data on the unit mapped as the "Main Series" basalts of Southern Ethiopia. We compared these data to the extant Amaro and Gamo database and found that the "Main Series" were identical to the Gamo basalts. Our dataset reveals that the Gamo basalts cover a much larger area than was previously known. Furthermore, these results constrain the older Amaro basalts to the southeastern part of the province. Our continued investigation of these rocks includes petrographic analysis and comparison with the younger Oligocene basalts in order to contribute to a unified model for magmatism in this region.

ANALYZING TARGET CELL BULGING UNDER HIGH PRESSURES
Jon Droste
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 447
Mentor(s): Remco Zegers, Jorge Pereira Conca

Have you ever wondered what happened seconds after the Big Bang, or what processes occur when a star explodes into a supernova? At the National Superconducting Cyclotron Laboratory (NSCL), many hands are collaborating to unearth some of these phenomena through a class of nuclear reactions known as charge-exchange reactions. Charge-exchange reactions occur when a neutron from a projectile beam is swapped for a proton in a target nucleus, or vice-versa. These experiments are often constructed with a target cell containing liquid hydrogen (a proton target) that is isolated in a vacuum beamline. A projectile beam is then sent through the target to produce the reaction. In order to accurately analyze these reactions, a strict control of variables is required. This project explores the analysis and effects of two of these variables: the hydrogen target cell bulge and window material. With relatively large pressures inside the target cell, and vacuum level pressures outside the cell, a substantial amount of force is exerted on the interior windows resulting in an outward bulging effect. In turn, the thickness of the cell is increased, which increases the amount of Hydrogen that the beam can interact with. The type of material used in the cell windows is also important when analyzing experiment results. Due to interactions with the beam, different window types generate varying levels of background "noise". Ultimately, understanding the cell window bulge and the effects of varying window compositions is essential for taking accurate measurements and producing trustworthy results for future NSCL experiments.

FASHION & SCIENCE: WHAT YOU WEAR ON A MICROSCOPIC LEVEL
Maria Irimie
Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 449
Mentor(s): Per Askeland, Carl Boehlert

The progression of human clothing from animal hide to woven fabric to synthesized, complicatedly woven fibers has created a medium of human expression that is almost limitless. Clothing protects us from weather, dirt, injury, infection, and even beyond protection, the development of fabric in the fashion industry for various aesthetic purposes combines aesthetic and scientific progress into one simple thing. But what actually gives different types of fabrics their different properties? In this research project, I intend to both examine the properties of three different types of fabric (polyester, nylon, and cotton) in a relaxed state, but also examine how they deform after tension is applied. In order to accomplish these two tasks, I will first cut, clean, and examine the samples under an electron microscope, examining arrangement of the fibers as well as their porosity and how much they've frayed. Then, I will perform a creep test on each material, comparing their Stress-load graphs to each other to show the deformation over time under stress.In the end, I hope to

show that the versatility of fabric comes from a level much deeper than weft, color, or feel; that fabric is versatile because of its base composition.

COMPARISON OF MARTIAN PHOENIX SITE SOIL TO EARTH ANALOGUE
Lane Capelli, Elizabeth Moore, Zach Stewart
Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 450
Mentor(s): Michael Velbel

Soil is an important aspect of any planet to study, especially on one like Mars, where humanity has been searching for signs of life, past or present, and hopes to begin human exploration. In our research we have analyzed a sample of sand that is somewhat analogous to the soil on Mars' surface at the 2008 Phoenix lander site under optical and scanning electron microscopes (SEMs), grading individual grains of olivine. Olivine is a mineral that says much about water on Mars, which is intrinsically linked to Mars' habitability. We graded the grains on their crystal habit, conchoidal fracturing, and abrasion. Crystal habit is the external shape, conchoidal fracturing is the presence of smooth, curving (broken-glass-like) fracturing, and abrasion is characterized by evidence of mechanical scraping or "sand-blasting" altering the grain's shape. So far, we have found that most of the analogue sand's olivine grains are anhedral in crystal habit, lacking conchoidal fracturing, and generally showing moderate to extensive abrasion, though some show signs of only slight abrasion. We experienced some difficulty in analyzing the grains due to the monochromatic SEM images, and our inability to view the grains from more than one angle. The next step in our research will be to analyze the images of the soil at the Phoenix landing site, analyze it, and compare it to the analogue, using the same categories of grading. The results of this comparison will then be discussed.

ANALYZING ANALOGUE SAMPLES OF MARTIAN SAND GRAINS THROUGH THE USE OF SCANNING ELECTRON MICROSCOPY
Allison Radke, Simran Patel, Ben Heasman
Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 451
Mentor(s): Michael Velbel

Knowledge about Mars is constantly expanding, especially with respect to soil composition and past availability of water on the planet. Mineral makeup and morphology of sand grains are especially important in inferring areas where it was possible for water to be present on or beneath the surface. Although this information is extremely important, there have been no sample returns from Mars. We used a common approach to compensate for this problem: a soil analogue with similarities to the soil found on Mars. We examined the surfaces of the grains for three different categories: crystal habit, conchoidal fracture, and abrasion. Crystal habit can be euhedral, subhedral, or anhedral, which are all terms used to describe the different degree of the planar crystal faces where they intersect at sharp linear edges. Abrasion can be seen on the grains by looking at pits and the overall shape of the grains. Conchoidal fractures are shown by smooth, curving (broken-glass-like) breakages on the surface of the grains. In order to classify the sand grains into different categories, we needed to get a closer look at the grains themselves. With the use of microscopic imaging we were able to obtain spectroscopic data, and pictures of grains at up to 180x magnification. These images enabled us to identify common surface features and the elemental makeup of each grain. The results will be used to interpret Phoenix OM images through comparison of grain surface features as well as mineral makeup of the analogue grains.

TEST OF OPTICAL PUMPING TECHNIQUE TO PRODUCE NUCLEAR SPIN POLARIZED BEAM OF POTASSIUM ISOTOPE
Joel Zuzelski
Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 452
Mentor(s): Kei Minamisono

Laser spectroscopy experiments are performed at BECOLA facility at NSCL/MSU to further our understanding of nuclear structure and fundamental symmetries. An experiment to measure the beta-decay asymmetry parameter from nuclear-spin-polarized potassium-36 is planned to eventually address physics beyond the Standard Model. An optical pumping technique will be used to produce the polarized beam, and a prototype laser system has been set up. The system includes an electro-optic-modulator to modulate the phase of laser light and induce side frequency bands to efficiently

pump multiple atomic ground states. Initial tests measurements were performed using a stable beam of potassium-39. Details of the setup, as well as the result of the test, will be discussed.

SURFACE TEXTURE ANALYSIS OF A TERRESTRIAL MINERAL ANALOGUE OF MARTIAN SOIL IMAGED BY THE PHOENIX LANDER
Douglas Heine, Pammy Matsika, Alexia Swiat
Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 453
Mentor(s): Michael Velbel

Olivine is a volcanic mineral with the formula FeαMg1-αSiO4 (0 < α < 1). Orbital spectroscopic evidence has indicated an abundance of olivine in the Martian crust, and it is expected to be prominent among Martian surface sediments as well. However, olivine on Earth is largely destroyed by chemical weathering processes involving water. The persistence of olivine on Mars is widely interpreted as indicating the absence of liquid water during much of Mars' natural history. This project aims to better interpret images of potentially olivine-rich Martian sand grains taken by the Mars Phoenix Lander by comparison with high-resolution optical and scanning electron microscope images of a terrestrial olivine-rich sand. From surface texture analysis, a general trend in mechanical modification features can be identified. The olivine particles tend to exhibit a subhedral shape, conchoidal fractures on most surfaces, and minimal evidence of abrasion. These observations are consistent with the crystalline and abrasion resistant character of olivine. The nature and degree of surface variation visible in the Mars Phoenix Lander images are compared with the weathering features apparent in the analogue images, and used to infer the extent of, and processes responsible for, mechanical weathering of the Phoenix-imaged grains.

EXPLORATION INTO THE POTENTIAL ENERGY SURFACE OF PRIMARY ALCOHOL CLUSTERS
Chris Mcallister
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 491
Mentor(s): James Jackson

Hydrogen bonding is an important intermolecular force that makes significant contributions to chemical, physical, and biological processes. Given the emerging importance of several primary alcohols as "green" solvents and building blocks, experimental and theoretical probing of hydrogen bonds is an area of constant research, particularly for its pronounced effects on alcohol in solution and the respective IR spectra. To probe these effects, optimized structures and IR active modes of various alcohol clusters (R-OH)m (m=1-4) where (R=CnH2n+1, n=1-6) are determined using ab initio quantum chemistry methods. For a subset of the structures obtained, exhaustive conformer searches provide insight into the potential energy surface for primary alcohol clusters, as well as provide a foundation for accurate quantification of primary alcohol clusters in complex solutions using IR absorbance spectra.

TRACING THE SUBDUCTION SIGNATURE IN THE PATAGONIAN BACK-ARC
Mariah Burnett
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 492
Mentor(s): Tyrone Rooney

Subduction zones occur when a tectonic plate is destroyed as it moves into a deep sea trench and travels underneath an adjacent plate. Volcanoes, which are a central part of subduction zones, provide insight into the cycle of elements as they transit from Earth's surface and travel into the mantle on a subducting slab, and eventually back to the surface again in magmas and associated volcanic gasses. While subduction flux has been broadly constrained through studies of existing volcanoes, the fine details remain an area of active research. Within the Andes of southern Argentina, the usual chain of volcanoes that define a volcanic arc are absent. Instead, volcanic rocks are located far inland and must require that the processes in operation here differ from normal subduction environments. In particular these displaced volcanoes give us the opportunity to relate the movement of fluids and melts in subduction zones to proximity of the subducting plate. Previous work on rocks younger than 20 Ma indicates that a fluid fluxed mantle melting signature is most significant closer to where the subducting plate enters the trench. We examine the geochemical signature of older rocks from the same location and find the opposite geochemical trends - the signature of fluid fluxed mantle melting is

greatest further from where the slab enters the trench. To resolve this seeming contradiction we explore the models of magma generation in this region and link our data with processes active within the subduction zone mantle.

PENNING TRAP TUNING FOR PI-ICR MASS MEASUREMENTS OF RARE ISOTOPES
Piper Brase
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 493
Mentor(s): Ryan Ringle

Phase Imaging Ion Cyclotron Resonance (PI-ICR) is a method used to measure the masses of rare isotopes with high precision and accuracy. PI-ICR requires a well-defined bunch of ions to be directed into a Penning trap, which confines the ions in three dimensions using electromagnetic fields generated by electrodes. The ions are then released from the trap and their angular distance and time data are used to calculate the cyclotron frequency which is proportional to the mass of the isotope. Our objective was to use Penning trap tuning to reduce the variation in beam spot size to make PI-ICR readings possible at MSU. We needed to optimize the electrode voltage settings of the Penning trap to overcome the imperfections in the electromagnetic field due to the holes in the ends of the trap. We used scans from the traditional time-of-flight technique (TOF-ICR) and compared two different frequency measures to find the optimal electrode settings to create the most perfect EM field. After using Mathematica to analyze the TOF-ICR data we found the ideal settings of 0.358 and 1.925 for the correction ring and correction tube respectively. These settings will allow for longer ion storage in the trap without distorting the beam upon exit. Using these settings will also create a smaller ion beam exiting the trap which allows us to use the position sensitive detector and move towards the PI-ICR method of frequency measurement, this is an improvement over TOF-ICR because it requires fewer data points and provides phase information.

VISOKE AND SABYINYO: UNDERSTUDIED POTASSIC VOLCANOES WITHIN THE VIRUNGA VOLCANIC PROVINCE
Felix Ishimwe
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 494
Mentor(s): Tyrone Rooney

Potassic alkaline magmatism is uncommon, occurring mainly within intracontinental extensional tectonic environments. The high concentration of alkalis in these lavas is thought to be related to either the low degree of melting in the upper mantle, or melts derived from metasomatized mantle. Ambiguity, however, arises from magma differentiation within the continental lithosphere. There is thus a compelling need to examine the mechanisms by which potassic magmas evolve within the continental lithosphere. The western branch of the East African Rift provides among the best examples of a potassic magmatic province. Within the western branch of the East African Rift, the Virunga Volcanic province is comprised of eight volcanoes. Karisimbi, Visoke and Sabyinyo, three of the more central and evolved volcanoes in the region, remain understudied. Here we examine the magmatic evolution of these volcanoes using petrographic and geochemical techniques. New field work has recovered 120 samples from these three volcanoes. Karisimbi hawaiites exhibit dominantly fractional crystallization processes consistent with geochemical trends, however, evidence of disequilibrium is also present in the form of rimmed biotite crystals, suggesting more complex magmatic evolution in Karisimbi. We compare this evidence of disequilibrium with latites from Sabyinyo, which have previously been hypothesized to originate from mixing between mantle-derived basanites and crust-derived silicic magma. Results of this study provide critical constraints on crustal processes which modify the parental melts allowing for better resolution of mantle processes controlling potassic alkaline magmatism.

CALIBRATION OF OPTICAL FILTERS FOR THE SINGLE ATOM MICROSCOPE
Lissa Pereira
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 495
Mentor(s): Jaideep Singh

Rare nuclear reactions are important for the discipline of nuclear astrophysics. The reason why such nuclear reactions are rare is because they happen at stellar energies which are lower than nuclear energies. The reaction that we will concentrate on is Ne-22(He-4, n)Mg-25. These are examined since they form an important neutron in the s-process in the nuclear reactions. By using a single atom microscope (SAM), we will develop an image that allows us to detect rare

nuclear reactions. The method that will be used for this is primarily based on the ability to optically detect single atoms in cryogenically frozen films. The SAM will be placed with a recoil separator in order to achieve an optical view of Magnesium in cryogenic film made of solid Neon. Through optical filtration we will be able to observe the magnesium atoms which will be determined by their fluorescence. This laser beam specifically allows the atoms to absorb light and become excited. Once the atoms relax, they emit light, which is what is essentially observed. We can determine what light corresponds to the Mg and which corresponds to the laser since the light of the laser is a different color than the light emitted by the atoms in medium. With this is mind the general goal is to detect the light coming from the atom, and not from the laser and from the room. I will present our calibration of optical filters used for this purpose. This work is supported by US National Science Foundation under grant number #1654610.

SIMULATING ENHANCED C12+C12 REACTION RATES FOR CARBON SHELL BURNING IN MASSIVE STARS
Matt Bundas
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 496
Mentor(s): Sean Couch, Jennifer Ranta

A major factor in the dynamics of stars as they pass through burning stages is how easily a given fusion reaction takes place, which is directly tied to the reaction rate. Reaction rates directly affect the composition and structure of a star which in turn affects other processes in the star. Reaction rates and in particular the Carbon-12 + Carbon-12 (C12-C12) rate are not easily measured in a laboratory setting, leading to dispute in their values. A recent paper from A. Tumino et. al experimentally found using the Trojan Horse Method (THM) underlying resonances in the C12-C12 to Mg 24 reaction rate, leading to a much enhanced rate compared to the standard Caughlan-Fowler 88 (CF88) rate. To test the potential effects of the newly found THM rate we ran two 20,000s 2-D simulations of a 25 solar mass star undergoing carbon shell burning using the hydrodynamical astrophysical code FLASH, one implementing the CF88 C12-C12 rate and one implementing the THM rate. I examine the increase in nuclear energy production, increase in strength of convection, and change in element abundance within the star.

MODELING RADIAL MIGRATION OF STARS AND GAS IN THE MILKY WAY
Megan Davis
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 497
Mentor(s): Brian OShea

The chemical abundances in different stellar populations are the integrated history of a galaxy, and those studying Galactic Chemical Evolution (GCE) use theoretical models to try to tease apart that history. The One-zone Model for the Evolution of GAlaxies (OMEGA) is one such model. OMEGA is a simple, semi-analytical model that simulates an entire galaxy as a single, uniformly mixed volume. This means that spatial distributions and radial migration of material are not accounted for. For galaxies like the Milky Way, we know this model is inaccurate. Simple OMEGA models and probes into GCE, like the APO Galactic Evolution Experiment (APOGEE), show that there are discrepancies not accounted for. Since OMEGA cannot currently account for them, we have developed a multi-zone module that is able to more accurately represent disk-like nature of a galaxy. This updated model will create more accurate depictions of the Milky Way, and will eventually make synthetic sky surveys similar to APOGEE.

HIGH VOLTAGE ELECTRODE CONDITIONING FOR USE IN THE MEASUREMENT OF THE PERMANENT ELECTRIC DIPOLE MOMENT OF RA-225
Peyton Lalain
Physical Sciences, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 498
Mentor(s): Jaideep Singh

The presence of a permanent electric dipole moment (EDM) is an indication of the violation of time-reversal symmetry. Symmetry violations of this type are needed to explain the dominance of matter over antimatter in the universe. Due to its pear-shaped nucleus, the Radium-225 atom has an increased sensitivity to the violation of time-reversal symmetry. A uniform and stable electric field is applied to an ensemble of Radium-225 atoms in order to search for its electric dipole moment. We search for an EDM by building an atomic clock using magnetic fields and testing to see whether it is faster or slower under the application of an electric field. We aim to increase the sensitivity of our experiment by increasing

the electric field by at least a factor of three. Our contribution to this goal is conditioning round Niobium electrodes to remove microscopic imperfections which allows us to achieve higher electric fields. Our progress is measured by monitoring the electrodes for discharges as well as steady state leakage current as we increase the potential difference between the electrodes. We define a steady state leakage current to a continuous current around 600 pico-amps. Discharges are spikes on the order of 1 nano-amp in our monitored measurements of the leakage current. This work is supported by Michigan State University, the Director's Research Scholars Program at the National Superconducting Cyclotron Laboratory, and the U.S. DOE, Office of Science, Office of Nuclear Physics, under contract DE-AC02-06CH11357.

SAND ACROSS THE WORLD: THE STRUCTURE AND COMPOSITION OF SAND SAMPLES INVESTIGATED USING SCANNING ELECTRON MICROSCOPY
Theresa Waeltermann
Physical Sciences, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 499
Mentor(s): Per Askeland, Carl Boehlert

Some important questions in the area of geology are often: where did a sample come from and how was it formed? Geological research studies have shown that sand usually comes from a mountain range and travels downwards through valleys and rivers. During that process the rocks grind each other down and become small sand particles. However, sand can also be found distant from mountain ranges, like in the Caribbean. Sand is known to travel hundreds of miles from its origin to the beaches where it is found. At times it can be difficult to determine what the sand you stand on is made of, and how it got there. My research project provides insight into the composition and origin of sand samples from the Pacific Coast, Europe, the Caribbean and the Great Lakes. I use a combination of optical microscopy and scanning electron microscopy to examine multiple samples and combine my results with information about the geographic structure of the sample location. My findings elaborate on our knowledge of the composition of sand, giving more insight into where sand is from and what it was made of. In my presentation, I will discuss the process of using the electron microscope, analyze the differences between sand samples and showcase special structures found in the sand samples. I anticipate my research to lead information about what sand is constructed of, and help to address the key question of where a sample comes from and how it was formed.

LANTHANIDE DATABASE FOR THE R-PROCESS
Pranav Nalamwar
Physical Sciences, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 500
Mentor(s): Jaideep Singh

The rapid neutron capture process, or R-process, refers to the formation of the heavy chemical elements through the act of continuous bombardment of pre-existing atoms with neutrons. It has been theorized neutron star mergers are the sites at which the majority of the naturally occurring lanthanides such as Neodymium, Cerium, and Lanthanum, were made in the universe. Recently, LIGO and VIRGO detected GW170817 and AT2017gfo, a neutron star merger with an associated kilonova, respectively. A kilonova is an electromagnetic counterpart to the neutron star merger that results from the merger itself and radioactive decay of heavy r-process nuclei. However, it was quickly determined there is little known about the heavier elements' spectral lines, which are given off from the heavy r-process atoms at varying stages of the kilonova, so theorists have only been able to predict the spectral lines' values for wavelength. Therefore, in order to fully comprehend the mechanisms involved in the creation of the lanthanides for multiple ionization charge states, it was decided a literature search would be the first step in discovering the missing spectra. The literature search is intended to address the lack of information regarding the lines by compiling data from multiple sources so that later research can primarily focus on spectra that has yet to be studied. The prospect for this project includes understanding the exact operations associated with the rapid neutron capture process.

EVOLUTION OF SHOTGUN AMMUNITION
John Ray
Physical Sciences, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 501
Mentor(s): Carl Boehlert, Per Askeland

Throughout American history, ammunition has been a valuable yet destructive tool. The use of these tiny metal pieces has been a hot button issue that has penetrated the American society for decades. The handling of these little weapons is embedded in our constitution as our 2nd Amendment right. However useful or destructive ammunition is, one thing is true, the level of speed, precision, and damage of a bullet has only become more and more efficient as the decades pass. The properties of these bullets are directly indicative of their composition. Through Electron Microscope Spectroscopy and other material science techniques, the anatomy of ammunition can be analyzed. Furthermore, this analysis can be used to decipher and explain the capabilities of different kinds of ammunition. This venture will specifically focus on the ammunition of the shotgun. Using the aforementioned tactics, a sequential evolution of shotgun ammunition can be uncovered. The obvious inference being that the older ammunition will be slower, bulkier, but ever so destructive due to being made of big bulky metal. While the newer ammunition will be faster, more precise, but not as destructive. As this era of ammunition is dominated by precision, with sleeker less bulky metals composing most new ammunition.

LENDA CALIBRATION FOR CHARGE EXCHANGE REACTION IN INVERSE KINEMATICS
Charlie Hultquist
Physical Sciences, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 502
Mentor(s): Remco Zegers, Jaclyn Schmitt

Nuclear structure and the study of the evolution of nuclear structure away from stability is of interest to physicists because of its applications in nuclear many-body systems and the synthesis of heavy chemical elements in astrophysical events. We can study the decay products of charge-exchange (CE) reactions, interactions where participating nuclei exchange a proton and neutron, to gather insight into the complex process of nuclear decay. To do so, we need detectors that can accurately measure the position, energy, and time of flight of such decay products. The Low Energy Neutron Detector Array (LENDA) is an array of highly efficient, position-sensitive plastic scintillators developed by the National Superconducting Cyclotron Laboratory Charge-Exchange group. LENDA is specifically used for the detection of low energy (~100 keV-10 MeV) neutrons produced in CE reactions. LENDA was recently used in a study of the Nitrogen-12(proton, neutron) reaction in inverse kinematics, where an incoming Nitrogen-12 beam collided with a stationary proton target, producing an Oxygen-12 nucleus and free neutron. Measuring the cross section, or likelihood, of this interaction allows us to extract the so-called Gamow-Teller Transition strength, which in turn can be used to learn about the structure of this nucleus. LENDA will detect these neutrons and register the energy deposited in the detector, and we need to perform an energy calibration to correctly plot the energy spectrum of the neutrons. Previously, these calibrations were done by hand, making them inefficient and having a relatively large systematic error. This process was automated and refined, where given initial data about the LENDA bars, one can easily find the energy calibration parameters. This procedure is important for obtaining accurate result from the experiment.

RENORMALIZATION GROUP FOR MATRIX MODELS
Sara Jovanovski, Aven Zitzelberger
Physical Sciences, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 503
Mentor(s): Heiko Hergert, Scott Bogner

Renormalization group (RG) methods are a powerful tool for identifying the most important degrees of freedom of quantum many-body systems like atomic nuclei. This identification not only offers important physical insights, but also simplifies microscopic calculations of nuclear properties significantly. Practical applications of RG methods usually require approximations that can sometimes lead to uncontrolled errors. Here, we apply these methods to a simple model that captures the essential features of nuclei, and explore the conditions under which such errors occur. This work will contribute to a larger effort to enhance RG-based nuclear many-body calculations that are carried out by researchers at the Facility for Rare Isotope Beams (FRIB) and collaborators worldwide.

MAGMA AND VOLATILE COMPOSITION OF SOUTH ISLAND, TURKANA
Mary Owens
Physical Sciences, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 504
Mentor(s): Tyrone Rooney

The East African Rift is the largest volcanically active continental rift. At the center of the rift lies one of its most volcanically active areas, the Turkana Depression. Recent volcanism within the Depression comprises a series of islands, the most mafic of which is South Island. Lavas erupted here are a window into the melting conditions in the regional upper mantle. A critical unknown within studies of primitive melts in East Africa are constraints on the volatile content of rift magmas. Our data represents the first study of magma volatiles in the Turkana Depression, providing constraints on the volatile composition of the magma source and the depth of fractional crystallization. We present volatile data of olivine-hosted melt inclusions from South Island. CO2 values range from 1966 to 3131 ppm and H2O from 0.92 to 1.05 wt%. Compared to existing volatile data from East Africa, South Island CO2 values have higher concentrations than many other locations in the rift, with the exception of those from the western branch that are associated with carbonitites. South Island samples are similar to two Afar lavas in terms of H2O. Within the context of the volatile analysis, we explore the composition of the source melt and depth of fractional crystallization in order to make conclusions as to the melting conditions that have affected South Island. These data represent the only such volatile constraints in this portion of the rift and have broader utility to studies of rift magmatism within the region.

CALIBRATION OF AN OPTICAL SPECTROMETER FOR THE SINGLE ATOM MICROSCOPE
Ria Nikollau
Physical Sciences, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 505
Mentor(s): Jaideep Singh

Rare nuclear reactions occur inside of the stars of the galaxy. These rare reactions are necessary for the creation of the chemical elements. Our goal is to measure the rate at which these nuclear reactions occur, specifically Ne-22(He-4, n)Mg-25. This reaction is an important source of neurons for the astrophysical s-process. We are developing the ability to detect individual atoms, which have been embedded in films of cryogenically frozen solids. To do this, we will use a single atom microscope (SAM), along with a recoil separator, which allows for differentiation between isotopes. This method will detect and capture every atom with close to unit efficiency allowing us to view the Mg-25 in the thin, cryogenic film made of Ne. When a light beam of the appropriate color is shinned on an atom, the light is absorbed, and the atom becomes excited to a higher energy level. Light is emitted when the atom returns back to its ground state. The light that comes from an atom embedded within a noble gas solid is a different color than the light of the laser beam. This makes it feasible to identify which light is coming from the laser and which is coming from the atom. We want to calibrate how much light is coming from the atom compared to its surroundings. In order to do this, we will use a calibrated optical spectrometer. This work is supported by the United States National Science Foundation, under grant number 1654610.

THE MIDDLE: EXAMINING PULSED MAGMATISM IN EAST AFRICA USING THE MAKONNEN BASALTS
Liam Peterson
Physical Sciences, Oral Presentation
Section: 6, 8:30 AM, Room 36
Presentation Number: 831
Mentor(s): Tyrone Rooney

Flood basalts represent the largest mass-flux events between Earth's interior and crust, and have been linked to periods of global climate change and mass extinction throughout geologic time. Numerous studies of flood basalt systems have shown eruptive phases occur in pulses over short geologic periods. However, the controls on flood basalt genesis are not well constrained, and further study of their possible sources is necessary. The initial Cenozoic flood basalts in Ethiopia were generated by two pulses of magmatism, the first in southern Ethiopia during the Eocene, and the second in northwestern Ethiopia during the Oligocene. The Makonnen basalts, located in southern Ethiopia, are temporally and spatially bound by the Eocene and Oligocene magmatic pulses. The spatial separation between the Eocene, Oligocene, and Makonnen has complicated efforts to understand their relationship. Here we present the geochemical dataset from our previous work, and examine it with the addition of new petrographic data. Our analyses display geochemical similarities between the Makonnen basalts, and the Eocene Gamo unit, which suggest they represent the same magma.

This correlation extends the Eocene magmatic pulse temporally about 4 Ma, to 28.8 Ma, and spatially northward to the Blue Nile. In the context of the existing dual- and single-plume source models for the Cenozoic Ethiopian flood basalts, our data suggests two distinct magmatic sources due to the temporal overlap, distinct geochemical character of the Eocene and Oligocene, and lack of a transitional unit between the Eocene and Oligocene.

IMPROVING PROTON MASS DETERMINATION OF LATTICE QCD DATA
Nestor Kamwana
Physical Sciences, Oral Presentation
Section: 6, 8:45 AM, Room 36
Presentation Number: 832
Mentor(s): Andrea Shindler, Jack Dragos

By analysing Lattice QCD simulation data, we are able to determine the mass of the proton from the theory of quarks and interacting gluons. However, to achieve this we must construct the "Effective Mass" function Meff (t). This function converges to the mass of the proton, as long as we suppress contributions from excited state of the proton. To do so, we require a large source-sink time separation t. This poses a problem, as Meff (t) also suffers from an exponentially decreasing signal-to-noise for large t. In this study, we use multiple Meff (t) functions computed with varying proton creation and annihilation fields in the construction of a Generalized Eigenvalue Problem (GEVP). By doing so, we are able to use the resulting eigenvectors to create a linear combination of Meff (t) functions which optimized the coupling to the ground-state proton. This, in turn allows us to determine the mass of the proton from a region in t with a larger signal-to-noise.

THEORETICAL INVESTIGATION OF NEUTRINO-NUCLEUS INTERACTIONS AND APPLICATION TO EXPERIMENT
Garrett King
Physical Sciences, Oral Presentation
Section: 6, 9:00 AM, Room 36
Presentation Number: 833
Mentor(s): Kendall Mahn

One of the major goals of High Energy Physics is to measure the properties the neutrino. The properties of this fundamental particle can provide insight into why there is a stark difference in the amount of matter and anti-matter in the universe today. Accelerator-based experiments look to measure neutrino oscillation parameters, which are an important property of this particle. In these experiments, simulations of neutrino-nucleus interactions, known as event generators (EGs), are a critical source of systematic uncertainty in determining these parameters. EGs are built using approximate models of neutrino-nucleus interactions, which are computationally less expensive than state-of-the-art nuclear theory calculations. EGs need to be benchmarked against the best available models of neutrino-nucleus interactions to ensure that the essential physics is captured. In this work, the predictions of the observables for ν-^{12}C neutral current quasi-elastic scattering are generated with the EGs GENIE and NEUT. These predictions are compared with first principles nuclear theory calculations from the authors of Lovato *et al.,* Physical Review C, 022502 (2018). From these comparisons, it was found that NEUT had the right expected features for the approximate models used. When comparing against the state-of-the-art model, it was found that there was strength missing in the approximation. The comparisons made in this study will result in a publication and will benefit experiments that make use of these EGs.

ENERGY CALIBRATION OF A GAMMA-RAY SPECTRUM FOR EXPERIMENTAL NUCLEAR ASTROPHYSICS
Jordan Stomps
Physical Sciences, Oral Presentation
Section: 6, 9:15 AM, Room 36
Presentation Number: 834
Mentor(s): Christopher Wrede

Our team has developed a system to detect radiation associated with the beta decays of proton-rich nuclides at the National Superconducting Cyclotron Laboratory. The experimental data acquired will be applied to the field of astrophysics, specifically to the rates of nuclear reactions driving explosions on the surfaces of accreting white dwarf and neutron stars in binary systems. The detection system consists of a custom designed gas-filled charged-particle detector surrounded by the existing Segmented Germanium Array (SeGA) of 16 gamma-ray detectors. The combined Gas Amplifier Detector with Germanium Tagging (GADGET) system was successfully commissioned at NSCL in May 2018 and is ready for science experiments. The commissioning experiment produced a data set that is not merely diagnostic, but also has the potential to produce new science. In particular, SeGA provided detailed high-resolution information on the gamma radiation produced during the experiment. Processing this data includes calibrating and combining the

gamma-ray energy spectra collected and identifying peaks in the cumulative spectrum. Data analysis of these gamma-ray spectra is essential to construct an accurate beta decay scheme in concert with information from the particle detector. GADGET has recently run its first dedicated science experiment and will be upgraded in the future to expand the scope of astrophysical science it can measure.

SCIENTIFIC PRACTICES IN MINIMALLY COMPLETED PROGRAMS
Dan Oleynik
Physical Sciences, Oral Presentation
Section: 6, 9:30 AM, Room 36
Presentation Number: 835
Mentor(s): Paul Irving

Computational problem solving practices are beginning to be the center of many introductory physics courses. Specifically, within P-cubed, students regularly work on computational problems situated in physics that involve minimally working programs. Currently, very little research has been done on minimally working programs in relation to curriculum design, especially with how frequently they facilitate students in engaging with computational practices. After an initial coding of student work in class, we have identified extended periods of time where students were working on aspects of the problem that were not intended by instructors, which we coded as "distractors." Throughout the course of this presentation, we examine these distractors for computational practices and pedagogical benefits.

PLANT SCIENCES

MICROBIALLY MEDIATED CHANGES IN THE ROOT SYSTEM OF SWITCHGRASS DURING DROUGHT
Kisanet Gebresilase
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 379
Mentor(s): Tayler Chicoine

Plants under stressful conditions, such as drought, must alter their growth and behavior to survive, and plant-associated microbe interactions contribute to increasing productivity under drought. Studies suggest that microbes and root morphology influence drought tolerance. Herein, we study Switchgrass (Panicum virgatum), a perennial plant known for its ability to grow in marginal, drought-prone soils, but whose microbial contribution to its drought tolerance remains unknown. This study investigates how switchgrass's root system changes under drought and if microbes mediate changes in root morphology (specific root length, root length density, rhizosheath weight). We compared the drought and microbial interactions under three soil treatments -- rhizosphere (soil containing switchgrass associated microbes), bulk (soil comprised of more general microbes), and sterile. Our study found that specific root length and root length density were higher in the sterile soil than the two microbial soil treatments This may be because rhizosphere and bulk soils have microbes that can help with extracting nutrients and water, while in sterile conditions plants have to invest more in roots. There was no difference in rhizoheath weight, suggesting that this may not be a drought-specific adaptation for switchgrass. This study demonstrates that understanding the role of root-associated microbes and changes in the root traits of switchgrass during drought is essential to growing plants that can withstand threats of climate change and drought.

THE EFFECT OF ARC6 ON THE INTERACTION BETWEEN ARC3 AND FTSZ
Maryam Naeem
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 380
Mentor(s): Katherine Osteryoung

Chloroplasts, evolving from an endosymbiotic cyanobacterial ancestor, are essential organelles for the survival of plant cells due to their ability to perform metabolic processes and most importantly, conduct photosynthesis. Chloroplasts must divide to accompany the increase in both the number and size of cells during plant growth. Division, through binary fission, is initiated by the assembly of the stromal FtsZ ring (Z ring), a ring-like structure formed by the tubulin homolog proteins FtsZ1 and FtsZ2 in land plants and green algae. The chloroplast division protein ACCUMULATION AND REPLICATION OF CHLOROPLASTS3 (ARC3) is a direct inhibitor of FtsZ assembly. Previous studies using a yeast two-

hybrid assay showed that full-length ARC3 bearing the C-terminal Membrane Occupation and Recognition Nexus (MORN) domain did not interact with FtsZ, whereas a truncated version of ARC3, lacking this domain did. *In vivo*, however, both versions of ARC3 interact with FtsZs and inhibit its assembly, suggesting the existence of an ARC3 regulator. Here, we report that ACCUMULATION AND REPLICATION OF CHLOROPLASTS6 (ARC6), a membrane protein that stabilizes the Z ring to the inner chloroplast membrane, interacts with full-length ARC3 through binding to the ARC3 MORN domain. A yeast three-hybrid strategy was further developed to test the effect of ARC6 on the interaction between ARC3 and FtsZ. Results show that the binding of ARC6 enables full-length ARC3 to interact with FtsZ proteins in yeast cells. These findings suggest that ARC6 may be part of the mechanisms to regulate the inhibitory activity of ARC3 on Z-ring assembly *in vivo*.

MONOLIGNOL TOXICITY: THE SEARCH FOR A MONOLIGNOL TRANSPORTER
Matt Wirick
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 381
Mentor(s): Curtis Wilkerson

Research in biofuels has moved away from focusing on food-based plants to crops that are not in competition for food. The problem lies in obtaining energy from these crops. To obtain cellulose, the energy-rich molecule in the plant cell wall, a separation process from lignin, another component of the plant cell wall which intertwines with cellulose, is required. Lignin is a polymer that contributes to the rigidness of the plant cell, but also is expensive to digest in order to extract cellulose. Though the biosynthetic processes that form lignin from its monomers (monolignols) is well understood, the mechanism of how the monomers are transported out into apoplast remains unknown. The research focuses on finding the gene(s) responsible for the transport of these monolignols in the plant model *Arabidopsis thaliana*. Research has shown evidence of a transporter protein that can transport one of the three monomers of lignin, but the Wilkerson lab wishes to continue this study to identify other genes that may share this monolignol-transporting property. In my presentation I will explain the system the Wilkerson lab has developed to identify candidate genes of interest and assays conducted in search for a transporter protein, including a test for monolignol toxicity of different mutants. We hope our efforts will reduce the manufacturing cost of biofuels, thus making them more widely used.

TRANSMEMBRANE LOCALIZATION OF THE FISSION1 PROTEIN IN ARABIDOPSIS THALIANA
Megan Mulheron
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 382
Mentor(s): Jianping Hu, Stefanie Rhodes

Mitochondria, chloroplasts, and peroxisomes all play integral roles in the photorespiration cycle, thus making their abundance in plants of great importance. While they may appear distinct, it has been found that the organelle division machineries in *Arabidopsis* all share a common tail-anchored protein, FISSION1 (FIS1), suggesting its unique role as a limiting factor in the fission process. Past studies have demonstrated that the overexpression of *Arabidopsis* FIS1 isomers, FIS1A and FIS1B, contribute to an increase in peroxisomal and mitochondrial abundance, and that the FIS1A variant localizes to the chloroplast, suggesting triple membrane targeting of the FIS1 protein. Thus, our work is directed at developing a more expansive understanding of the role the FIS1A variant has in organelle division. The Gateway cloning technique was utilized to overexpress yellow fluorescent protein (YFP)-tagged FIS1A under the control of the constitutive promoter, CaMV35S, versus the native promoter. Currently, *E. coli* is successfully transformed with YFP-FIS1A, and future work involves an *Agrobacterium* mediated transformation of *Arabidopsis* to genetically and phenotypically determine the impact FIS1A overexpression has on the fission machinery. Additionally, to further uncover specific targeting of FIS1A to different organelles, *Arabidopsis* will be transformed with a YFP-tagged protein to the N- and C-terminal domains, to analyze the manner in which FIS1A is directed to different locations. Results are expected to mirror prior overexpression studies, with the potential of unveiling novel components of the mitochondrial, chloroplast, and peroxisomal division machinery.

DETERMINING THE INTERACTION RATIOS OF FTSZ PROTEINS DURING CHLOROPLAST DIVISION
Emily Graham
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 383
Mentor(s): Katherine Osteryoung

Chloroplasts, photosynthetic organelles, are derived from the endosymbiosis of a cyanobacterium by a eukaryotic cell. Populations of chloroplasts in plant cells are strictly maintained through division, which is necessary for photosynthetic capacity and ensures the inheritance of chloroplasts by daughter cells during cytokinesis. FtsZ proteins, found in bacteria and plants, are important in bacterial cell and plastid division. FtsZs are structurally similar to tubulin and function as GTPases. During division, FtsZs assemble into a membrane-tethered ring structure (the "Z-ring") at the mid-cell or mid-plastid. In bacteria, there is only one FtsZ family, whereas in plants this protein has diverged into two distinct families, *FtsZ1* and *FtsZ2*. Quantitative measurements of FtsZs in chloroplast division could determine the potential functional divergence between FtsZ1 and FtsZ2, which remains unknown. To this end, our goal is to quantify the interaction ratios of FtsZ proteins at the site of chloroplast division. To accomplish this, we are using two similar approaches. First, we will transform *Arabidopsis thaliana* with transgenes which express fluorescently tagged FtsZs. Each transgene will be transformed into the corresponding T-DNA mutant background, which we are in the process of genotyping. In parallel, will use CRISPR/Cas9 and homologous recombination to insert the fluorescent tag sequence into each of the native *FtsZ* gene loci in wild type *A. thaliana*, allowing us to more accurately quantify FtsZ protein levels during Z-ring formation. These methods will allow us to quantify FtsZ interaction ratios and will contribute to a greater understanding of the mechanisms underlying chloroplast division.

MICROBIAL CARBON SOURCING DURING DROUGHT: WE'LL C WHAT THEY CAN FIND
Shanna Hilborn
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 384
Mentor(s): Lukas Bell-Dereske

Carbon is the building block of all life, and microbes are no exception. Heterotrophic microbes in soil can derive carbon from their surroundings and adapt their carbon utilization depending on how their environment is disturbed or altered. We analyzed microbial carbon consumption in rhizospheric (adhered to root) and bulk (not in direct contact with root) soils associated with switchgrass using Biolog plates. Each plate had 31 available carbon sources allowing the identification of the predominantly used carbon of the soil communities. We found that the rhizospheric and bulk soils each use different carbon-containing molecules as their principal energy sources. This is likely because the rhizospheric soil microbes receive carbon exudates directly from the root and can be selective in what they consume, while the bulk soil microbes must gather more complex carbon molecules from the soil. After identifying the prevailing carbon sources for each soil type, the microbial communities were sown with switchgrass and exposed to drought and ambient rain conditions. Next, we were able to determine if the dominant carbon sources for each soil type changed under drought conditions. When exposed to drought conditions, stress is predicted to cause the roots to secrete different carbon sources. The rhizospheric soil microbes will adapt to use an alternate source due to its close proximity and ease of access to the exudates, while the bulk soil microbes will exhibit a smaller alteration of uptake patterns as they are already limited in what they can obtain from their surroundings. Though there were significant differences in the substrates used based on soil type, there was not a significant difference in those used based on rainfall treatment.

THE RELATIONSHIP BETWEEN BLUE LIGHT PHOTORECEPTORS AND POLYUNSATURATED FATTY ACID BIOSYNTHESIS GENES IN N. OCEANICA MICROALGA
Rachel Clark
Plant Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Ballroom
Presentation Number: 246
Mentor(s): Eva Farre

Polyunsaturated fatty acids (PUFAs) have various health benefits when consumed by humans, which make them a great interest in research. Many microalgae, such as algae from the Nannochloropsis genus, have the ability to accumulate high amount of PUFAs. Within some microalgae, there are proteins called Aureochromes that are blue light photoreceptors. In the microalgae Nannochloropsis oceanica CCMP1779, blue light has been found to increase the expression of fatty acid desaturase genes involved in PUFA biosynthesis. Therefore, I hypothesize that Aureochromes

mediate the blue light induction of fatty acid desaturase genes. To test this hypothesis, I am analyzing various Aureochrome mutants in Nannochloropsis oceanica. I will measure the expression of fatty acid desaturase genes using RT-qPCR in the Aureochrome mutants after exposing them to a blue light pulse. Secondly, I want to determine if Aureochromes are transcription factors that directly bind to the PUFA biosynthesis gene promoters. This will be examined through use of a yeast one-hybrid system.

DESTABILIZATION OF THE PLANT MICROBIOME ADVERSELY IMPACTS HOST HEALTH
Franchesca Dion
Plant Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Ballroom
Presentation Number: 247
Mentor(s): Sheng-Yang He, Caitlin Thireault

The plant microbiome promotes host health and disease resistance. While the microbiome is generally beneficial to plant health, our lab has identified several Arabidopsis mutants from an EMS screen that appear to develop disease-like symptoms in the presence of a naturally occurring microbial community. This initial observation was made apparent when our lab compared EMS 326 and EMS 223-4 grown under a germ-free environment and a colonized environment. While germ-free mutants remained healthy, colonized mutants would die off. By contrast, the parent and wild-type are typically even more productive in a colonized environment than germ-free. We are interested in investigating whether these mutants have lost the ability to selectively inhibit harmful microbial community members. Microbial colonization of EMS 326 and EMS 223-4 will be quantified and compared to the parent, and rRNA sequencing will be performed to identify bacterial community members present on the leaf. Identification of present bacteria will help reveal whether the mutants support a different community than the parent. Preliminary evidence indicates that the mutants carry a much higher endophytic bacterial load in leaf tissue as compared to the parent, and host different bacterial species.

COMPARATIVE ANALYSIS OF TWO FUNGICIDE SENSITIVITY TESTS FOR HELMINTHOSPORIUM SOLANI
Paige Pline
Plant Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Ballroom
Presentation Number: 248
Mentor(s): Noah Rosenzweig

Helminthosporium solani is a pathogenic fungus which causes silver scurf, a potato-specific disease often found in temperate regions. Silver scurf causes cosmetic defects in potato seed tubers which negatively impact the crop's marketability and storability. Specifically, as one of the country's leading producers of chipping potatoes, Michigan growers must implement strategies to manage the long-term storage of their product and mitigate this persistent disease. Thus, effective fungicides may control silver scurf and extend the storage period for potatoes. This study had two main goals. First, determine the in vitro sensitivity of *H. solani* to three classes of fungicides: DMI fungicides [difenoconazole (DFZ)], SDHI fungicides [solatenol (STL) and sedaxane (SDX)], and phenylpyrrole fungicides [fludioxonil (FDL)]. Second, compare the accuracy and precision of the spiral gradient dilution method to a standard tenfold agar plate dilution method. Tubers with symptoms of silver scurf were sampled from potato storages from the United States. The relative growth and germination of spores for all mono-conidial *H. solani* isolates were recorded to determine isolates sensitivity to the fungicides listed above. The spiral gradient dilution and agar plate dilution methods were used to estimate the effective fungicide concentration at which 50% of the fungal growth was inhibited (EC50) in vitro for all isolates.

IDENTIFICATION OF ENZYMES FOR GENETIC ENGINEERING OF GRASSES WITH GREATER BIOMASS ACCUMULATION
Lauren Sosinski
Plant Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Ballroom
Presentation Number: 249
Mentor(s): Curtis Wilkerson, Mingzhu Fan

In plant cell walls, a polysaccharide called mixed-linkage glucan (MLG) is an important component in grass cell walls. It is an easily fermentable polysaccharide and an ideal compound for production of biofuels. Our project goal is to increase the quality and quantity of biomass by genetic engineering of plants that accumulate a large amount of MLG. Recently, a Brachypodium distachyon trihelix family transcription factor (THX), BdTHX1, was found as regulator of genes involved with MLG accumulation. We found another THX transcription factor, BdTHX2, that shows similar expression patterns as BdTHX1. THX2 was shown to have higher expression in young vegetative tissues. However, the genes that it regulates

are still unknown. Likely, chromatin immunoprecipitation sequencing (ChIP-seq) experiments using an anti-BdTHX2 antibody and young vegetative tissues will give us potential gene candidates involved in MLG biosynthesis. The gene expression profiles of candidates will be compared to that of THX2 to determine the targets of THX2. Examining those candidates should lead us a better understanding of MLG accumulation in vegetative tissues and will be useful for genetic engineering of grasses that accumulate more biomass.

BUILDING A CHLOROPLAST ATP SYNTHASE COMPLEX ONE PROTEIN AT A TIME
David Kasperski
Plant Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Ballroom
Presentation Number: 250
Mentor(s): John Froehlich

Photosynthesis is the defining event commonly associated with plant life: it converts light energy, captured by pigment-containing light-harvesting antennae, into chemical energy that ultimately sustains all life on our planet. In plant cells, photosynthesis occurs within the chloroplast and involves protein complexes located within the chloroplast thylakoid membrane. The four major core photosynthetic complexes are: photosystem I, photosystem II, the cytochrome b6f complex, and the ATP synthase complex. Together, these core complexes constitute approximately 60 different integral membrane proteins, of which approximately half are nuclear-encoded. Furthermore, the biogenesis of each photosynthetic complex requires the coordinated synthesis, targeting, and subsequent assembly of both nuclear- and chloroplastic-encoded proteins to form functional photosynthetic complexes. In this poster, we focused our attention on the ATP synthase complex, which essentially produces all of the ATP, required by the plant cell. Specifically, we attempted to address the basic question: How is the ATP synthase complex assembled and finally inserted into the thylakoid membrane? From our investigation, we discovered a proteinaceous 'biogenesis factor' that is required for the assembling of a portion of the ATP synthase complex. Using classical cell biology techniques along with a genetic approach, we show that elimination of this 'biogenesis factor' caused a dramatic decline in the overall amount of ATP synthase complexes. We will also provide additional results showing the impact on overall plant function when ATP synthase complexes are severely reduced. Finally, a hypothetical model showing how our biogenesis factor helps assembly the ATP synthase complex will be described.

EMS MUTAGENESIS OF ARABIDOPSIS THALIANA DOUBLE MUTANT
Elizabeth Brooks
Plant Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Ballroom
Presentation Number: 251
Mentor(s): Sang-Jin Kim, Starla Zemelis-Durfee, Federica Brandizzi

A useful approach to discovering gene functions in organisms is to induce mutations, producing different phenotypes by disturbing biological functions. The cell wall is crucial to the structural support of a plant and acts as a filtering mechanism. Pectins are polysaccharides of the cell wall that are important to cell wall strength and overall plant growth. Our lab has demonstrated that the cotton Golgi-related 3 (CGR3) and its close homolog CGR2 are critical to pectin biosynthesis and methylesterification, which can effect plant growth and development in *Arabidopsis thaliana.* The CGR2 and CGR3 double knockout showed reduced levels of pectin methylesterification, as well as dwarfism and defects in hypocotyl elongation. The purpose of this study is to discover components that generate pleiotropic effect on the model plant *Arabidopsis thaliana* using ethyl methanesulfonate (EMS) mutagenesis. By using EMS mutagenesis on the *cgr2/3* double knockout mutant, we can identify genes that complement *cgr2/3* growth phenotype in order to better understand the role of pectin and plant growth. In observations of EMS mutated plants' growth, multiple plant lines were observed as having improved growth whilst maintaining the *cgr2/3* double mutant background. Further studies will be needed to determine the mutated sites and biological pathways in the EMS mutated *cgr2/3* plants that can improve plant growth.

DNA EXTRACTIONS OF CALICIOPSIS
Benjamin Jones
Plant Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Ballroom
Presentation Number: 252
Mentor(s): Monique Sakalidis

Caliciopsis is a genus of fungal pathogens that cause cankers in conifers. Caliciopsis pinea has been attributed to dieback and mortality in white pine (Pinus strobus) in New England and the southern Appalachians. In 2018, an uncharacterized species of Caliciopsis was isolated from a canker on a white pine branch. A survey of Michigan white pine stands in 2018 found and sampled Caliciopsis in 30 out of 56 sites and suggested that C. pinea may also be in the state. The goals of this project are to confirm the presence of multiple species of Caliciopsis on Michigan white pine and to test their relative pathogenicity. To identify the species of the Caliciopsis isolates collected during the surveys, DNA will be extracted and amplified through PCR and the ITS gene region will be sequenced. This information will be used to map the distribution of Caliciopsis species on Michigan white pine. The relative pathogenicity of the Caliciopsis species will be tested on white pine seedlings in a greenhouse trial. As part of a multi-state colaboration, 361 samples of Caliciopsis have been collected from white pine in 10 other states. We will also extract and sequence DNA from these samples, the results of which will be used in a later population genetics study.

GENETIC ANALYSIS OF IMPORTANT TRAITS IN THE COMMON BEAN TO MINIMIZE THE ADVERSE EFFECTS OF CLIMATE CHANGE ON BEAN PRODUCTIVITY
Georgia Warmbein, Natalie Phillips
Plant Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 568
Mentor(s): Ali Soltani

As climate change is becoming a greater threat to planet Earth, scientists are looking to find new ways to solve problems that are consequences of it. Climate change is associated with occurrence of more heat waves, droughts, flooding, and many other issues. These issues lead to lower yields in crop production, which in turn, lowers food security. Beans are a very important food source in many countries and many people rely on them for their main sources of protein and fiber. Unfortunately, beans are relatively susceptible to heat and flooding that can potentially reduce its production in the future. In our group, we are conducting research to locate the genes that are associated with flooding and heat tolerance. There are two main parts to any genetic analysis. The first is phenotyping; this is where we measure the response of diverse plant varieties to stress. For example, we are measuring the seed production of the plants that were grown under heat stress. In this way, we can distinguish between tolerant and susceptible varieties. The second part is genotyping; this process reveals information about the DNA composition of the plants. By linking these two components, we can identify the location of the gene(s) that contribute to tolerance. Genetic studies are important because we can locate and eventually identify the genes that are associated with important traits. The Lowry Lab is trying to solve the problems raised by climate change through genetic studies of important traits in the common bean.

THESE CHERRIES MAY BE SOUR, BUT THIS RESEARCH IS REALLY SWEET!
Annie Hillenberg, Delaney Collazo, Philip Longueuil, Taylor Wirsing, Roshan Patel, Kat Munsell, Savannah Finley, Mitchell Alekman, Ramya Chigurupati, Brooke Garland, Jailyn Hicks, Kaitlyn Hein
Plant Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 569
Mentor(s): Patrick Edger

Prunus cerasus L. (the sour cherry) is an allotetraploid--a species that contains three or more complete genomes. This study investigates the polyploid origin of *Prunus cerasus* L. by aiming to identify the parental progenitors that contributed to the formation of this new species. We determined the phylogenetic relationships based on millions of organellar and nuclear DNA markers, as well as the geographic distributions among *Prunus* species. Our research uncovers the evolutionary origins of the sour cherry--a highly coveted fruit among Michiganders.

ELUCIDATING THE ROLE OF COMMON BEAN PVSUT2 IN SUCROSE PHLOEM LOADING AND DISSECTING ITS POTENTIAL FOR ENGINEERING HEAT TOLERANT PLANTS
Madeline Bresson
Plant Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 570
Mentor(s): Thomas Sharkey

Due to global warming, the average temperature around the world has been increasing, and will continue to do so, unless drastic measures are taken. Since many crops are limited by their optimum growing temperature, it is imperative that we breed crops capable of withstanding increased temperature. Sunlight is essential to photosynthesis in leaves, a process that ultimately produces food for plants in the form of sucrose, amongst other metabolites. Sucrose is needed in sink tissues, such as fruits and seeds. In order for the leaves to supply sucrose to these organs, sucrose is loaded into the phloem and translocated to these sinks. In the sinks, sucrose is broken down into simpler metabolites, which are necessary for fruits and seeds to properly develop. The important phloem loading step relies on sucrose transporters (SUT), which are found in many tissues in all plant species. Our research hypothesizes that a newly identified gene (*PvSUT2*) encodes a sucrose transporter protein that loads sucrose in the phloem. In this research the gene from the bean plant is isolated and inserted into a known Arabidopsis phloem loading mutant (*Atsuc2*) to study the function of this new gene. Once the *PvSUT2* gene is transferred into *Atsuc2*, we will analyze its function of loading sucrose into the phloem and how this affects leaf metabolism. We will further study the importance of increasing sucrose phloem loading on plant heat stress tolerance to determine if this process can be targeted for generating heat tolerant plants, either through traditional breeding programs or transgenic approaches.

MAKING A CONNECTION: IDENTIFICATION AND CHARACTERIZATION OF 'CONTACT SITES' BETWEEN CHLOROPLASTS AND THE ENDOPLASMIC RETICULUM
Emily Diederich
Plant Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 571
Mentor(s): John Froehlich

Plant cells contain many unique membrane bound cellular structures, such as the nucleus, mitochondria, plastid (Chloroplasts), endoplasmic reticulum (ER), vacuoles, peroxisomes and Golgi apparatus. Each organelle carries out specific activities that are necessary for the survival and normal functioning of the plant cell. For example, some of these processes include synthesizing fatty acids, defense compounds, hormones and sugars. In particular to plants, the chloroplasts are the site of photosynthesis a process whereby light energy is converted into chemical energy that is utilized by the plant cell for various functions. Traditionally, the structure of the plant cell has been viewed merely as a collection of autonomous organelles acting independently of each other. However, recent advances in cell imaging, has provided a more dynamic picture of the plant cell. For instance, it has been shown that organelles can communicate directly with each other through structures called membrane 'contact sites' , which are formed by the close apposition of membranes of two organelles. It is within these zones that it has been proposed that metabolites can be exchanged between various organelles. 'Contact sites' between the ER and peroxisomes, ER and mitochondria, ER and the plasma membrane have already been identified and characterized. In this poster, we present data that characterizes two ER membrane proteins that may play a role in the formation and function of a novel contact site between the ER and the Chloroplast. Finally, strategies to identify additional protein components of the ER/Chloroplast contact site complex will also be presented.

GRANIVORE PREFERENCES FOR LOCAL PRAIRIE PLANT SPECIES
Sarah Johnson
Plant Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 572
Mentor(s): Jen Lau

Understanding mechanisms by which species become locally extinct can help predict future species declines. Identifying trait differences between locally extinct and present species can help identify the characteristics associated with species losses. Granivory (seed predation) can be an important biotic factor via consumer preferences and may be higher in rare species than common congeners. Granivory has also been shown to limit population growth and may therefore influence species declines and extinctions. However, we do not know how granivory may have influenced local extinction events.

We ask: (1) Does seed size differ between locally extinct and present species? (2) Does granivory differ with seed size? (3) Does granivory differ between locally extinct and present species? We set out 150 seed trays containing 5 confamilar pairs of locally extinct and present species in a restored prairie for one week and calculated the proportion of seeds removed by arthropods and small mammals. Granivory was higher on present species seeds, suggesting that seed predators may prefer more common species. While extinct species had larger seeds than present species, granivory was independent of seed size. This study helps determine if granivory influenced local extinction events and how present prairie species might be affected by seed predation.

THE SCALES OF POLLEN MOVEMENT WITHIN AND BETWEEN RESTORED PRAIRIE FRAGMENTS
Jenna Walters
Plant Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 573
Mentor(s): Lars Brudvig

Plant-pollinator interactions are fundamental to the persistence of populations in fragmented ecosystems, including prairies of North America. With inadequate rates of pollen dispersal, low rates of gene flow can lead to inbreeding and population declines. Yet, we know little about the scales over which pollen disperses in fragmented prairie landscapes. I studied pollen dispersal of three species commonly sown in restored tallgrass prairies: Coreopsis lanceolata, Heliopsis helianthoides, and Ratibida pinnata. To evaluate pollen dispersal, I placed fluorescent powder on flowers, which was then carried and deposited by pollinators. This enabled me to track the locations and distances pollen moved. I investigated two questions: (1) over what distances is pollen moving within restored prairies?, and (2) does an agricultural field reduce pollen movement rates between, relative to within, fragments? I demonstrate that for H. helianthoides and R. pinnata, 86% and 92%, respectively, of recovered pollen moved 50m or less along a 150m transect. In addition, the farthest movements recorded within the fragment were 125m, 120m, and 139m for C. lanceolata, H. helianthoides, and R. pinnata, respectively. I also found that an agricultural field impedes rates of dispersal, recording only one deposition occurrence among fields, compared to 19 depositions at a comparable distance within fields. These results improve our understanding of the distances that pollinators transport pollen within fragmented ecosystems. Furthermore, it has implications for land managers- both considering the distance between fragments before planting, and utilizing physical features, such as corridors, to ensure sufficient connectivity and gene flow between fragments.

PEPPERMINT PLANTS THRIVE UNDER INTENSE LED LIGHT
Alena Bowman
Plant Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 574
Mentor(s): Shiyou Ding

Herb gardens are gaining popularity and many herbs need full sunlight to grow. However, sunlight can be scarce in some areas, especially during the fall and winter months. LED and fluorescent (CFL) lights are popular energy sources for indoor gardening. In order to determine which light source encourages the most plant growth, the growth patterns of peppermint plants were observed as they were exposed to natural light, full-spectrum LED light, and full-spectrum CFL light. Peppermint seeds were planted in trays under each light source, and the trays under artificial light were isolated to minimize contamination from other light sources. As the plants grew, their height, number of leaves, and maximum leaf length were recorded. Seeds germinated in CFL and LED conditions, but not in natural light. This is likely as a result of low natural light intensity. The peppermint seeds exposed to LED light had the most germination and the most growth, as well as the highest intensity light, leading to the conclusion that as light intensity increases, so does plant growth. LED light sources are more energy efficient than CFL light sources, allowing for more plant growth with less energy cost, making them the best choice for illumination of indoor gardens. Future research should investigate maximum light intensity for peppermint plant growth and further inquire into how light type affects plant growth and development.

THE DETECTABILITY OF SPRUCE DECLINE THROUGH DENDROCHRONOLOGY IN PICEA PUNGENS
Tom Charney
Plant Sciences, Oral Presentation
Section: 4, 11:00 AM, Room 36
Presentation Number: 841
Mentor(s): Frank Telewski

Colorado blue spruce (Picea pungens) has been one of the most popular trees to use in Michigan landscapes; this is largely due to how quickly they grow, their thick foliage for wind breaks and privacy, and their foliage's bluish hue. However, that dominance is under threat with the emergence of "spruce decline" in the past 20 years (McTavish et. al submitted). Spruce decline is a condition in which the tree's foliage begins to dieback as a result of multiple causes, such as climate stress and damage from pests such as insects, but fungal pathogens are the primary driver for decline for blue spruce in Michigan. Specifically, a genus of fungus called Diaporthe seems to be the greatest biological agent. The telling signs of this fungus' presence is the death of spruce needles from the bottom moving upward, and the formation of cankers. However, these fungi are termed secondary pathogens, considered generally weaker, bringing to question how many other factors are causal agents of spruce decline. In the case of Blue Spruce in Michigan, the increase in infection rates may be due to multiple stresses inflicted upon the trees, making them more susceptible. Blue spruces originate from arid regions in the western U.S. (Kittel et al. 2012), conversely, Michigan's climate is considerably more humid. Additionally, Michigan's annual temperature increased by 1.3°C since 1980 and precipitation increased by 1.5 mm since 1930 (Andresen 2012), further pushing conditions away from their ideal western climate. The widespread nature and severity of spruce decline makes it a concern for the landscape and Christmas tree markets in Michigan. The symptoms of spruce decline often lead to death of the tree, greatly reducing its aesthetic value; but, perhaps ecological and other financial concerns are warranted if Blue spruces, or native tree species' survival are threatened. Spruce trees provide critical habitat for plants and animals in the Northern Hemisphere. There is also warranted concern for other tree species in Michigan such as Scots pine (Pinus sylvestris) and Austrian pine (Pinus nigra), which are also susceptible to fungal infection by Diaporthe (O'Donnell 2014). It would be in the interest of ecological welfare and economic pursuits to accurately model spruce decline; identifying a climatic signature that stresses the tree and facilitates fungal infection and spruce decline could very well be a means to that end.

EFFECTS OF CO-INOCULATION OF FUNGAL AND BACTERIAL ENDOPHYTES ON BIOMASS AND INFECTION OF ROOTS BY ENDOPHYTIC BACTERIA IN BRACHYPODIUM DISTACHYON
Julian Liber
Plant Sciences, Oral Presentation
Section: 4, 11:15 AM, Room 36
Presentation Number: 842
Mentor(s): Gregory Bonito

Bacteria and fungi are ubiquitous companions of plants, as they co-occupy the soil, rhizoplane, and tissues of their host plants. Endophytic bacteria, which live within plant tissues, may affect their host via hormonal signaling, and can improve the host's tolerance to stresses. Bacteria are known to migrate along fungal hyphae in soil and cheese, but the movement of endophytic bacteria into their host plants along fungi is poorly explored. It was hypothesized that inoculation of bacteria and fungi together would increase the bacterial infection into roots with to enhance the benefits of bacterial endophytes. This research explored the compatibility of bacterial and fungal partners deriving from switchgrass by volatile effects, the biomass effects of inoculation of bacteria and fungi, and the differential infection of roots by bacteria with or without fungal partners. The bacterial endophyte used was *Enterobacter ludwigii* FCP2-01, which was transformed with eGFP for fluorescent microscopy. Volatile interactions with fungal strains were synergistic for *Mucor circenolloides* and antagonistic for *Fusarium oxysporum*. Four fungal strains were then grown with or without bacteria on MS/2 plates with *Brachypodium distachyon* seedlings. Significant interactions of the bacteria and fungi were observed on biomass of roots and shoots, but no significant effects of fungal co-inoculants on bacterial abundance in roots were observed. Select endophytic fungi may provide a means to improve the health and resilience of crop plants through interactions with bacterial endophytes, but further trials in realistic conditions are necessary.

PROXIMITY LABELING INTERACTORS OF TIC22, AN INTERMEMBRANE SPACE PROTEIN IMPORT COMPONENT OF THE CHLOROPLAST
Sara Campbell
Plant Sciences, Oral Presentation
Section: 4, 11:30 AM, Room 36
Presentation Number: 843
Mentor(s): Lynn Richardson

Tic22 is a protein located within the intermembrane space of the chloroplast that has been thought to connect TOC/TIC translocons and play a role in nuclear-encoded protein import, though its function is not well understood. BioID2, a promiscuous biotin ligase, was fused to Tic22 homologs Tic22-III and Tic22-IV, and Tic22-III's transit peptide, and expressed in *Arabidopsis*. Streptavidin immunoblots of total protein extracts of these plants showed biotinylated putative interactors of the fusion proteins via proximity labeling. Protein mass spectrometry can be used to identify these interactors.

GENOMIC ANALYSIS OF NITROGEN FIXATION IN COMMON BEANS FROM THE MESOAMERICAN GENE POOL
Sarah Ruth
Plant Sciences, Oral Presentation
Section: 4, 11:45 AM, Room 36
Presentation Number: 844
Mentor(s): Andrew Wiersma, James Kelly

Modern agricultural practices have become reliant on nitrogen fertilizers which increase farm productivity, but create additional expenses and environmental pollution. Legumes have the potential to be grown without nitrogen fertilizer because they form symbiosis with soil bacteria, called rhizobia, which allow them to utilize atmospheric nitrogen. Unfortunately, dry beans do not fix nitrogen as well as other legumes, such as soybean and cowpea. Breeders may be able to improve this by selecting varieties that grow equally well in nitrogen-free and fertilized environments. To evaluate N-fixation in common bean, pairwise comparisons between fertilized and unfertilized treatments were performed on a diverse panel of Mesoamerican (n = 75), Andean (n = 25), and wild beans (n = 8). The panel represented many dry bean market classes, including: black beans, navy, Great Northern, pinto, kidney, cranberry and yellow beans. The plants were grown under greenhouse conditions. Both treatments received rhizobia inoculum. Shoot biomass, root biomass, biomass indices, nitrate-reductase activity, and degree of nodulation were evaluated. Genome wide association analysis (GWAS) was performed to identify genomic regions associated with nitrogen fixation traits. Biomass of unfertilized plants varied from 90% less than their fertilized counterparts to 20% more. Possible candidate varieties for future breeding projects include Black Velvet (black bean), Burke and Fargo (pinto beans), and Orion (Great Northern). Nitrate reductase activity was not correlated with nitrogen fixation. Results indicate that while nitrogen fixation is a complex trait, there is ample variation for breeders to use when selecting varieties with higher nitrogen fixation efficiency.

EVALUATING BIOPESTICIDE EFFICACY FOR CONTROL OF BOTRYTIS CINEREA ON GERANIUM (PELARGONIUM × HORTORUM)
Echo Prafke-Marson
Plant Sciences, Oral Presentation
Section: 4, 12:00 PM, Room 36
Presentation Number: 845
Mentor(s): Blair Harlan, Mary Hausbeck

Naturally derived pesticide products are publicized as a new frontier in pest management. Producers and consumers often revere these products for the monetary, efficacy, and safety promises, over synthetic products. But what is the evidence supporting their superiority to standard synthetic chemicals? Though the market for biopesticides is growing in California, the most agriculturally prolific state, none of the top use pesticides for the state meet the EPA's definition for biopesticide. Studies promoting promising prospects for biofungicides are published every year, in increasing numbers, yet few products are developed based along these studies. With so many biopesticides products on the market, how might they compare to the standard synthetic products? How might different biopesticides compare to one another?

EVALUATING THE EFFECTS OF SWITCHGRASS MOSAIC VIRUS INFECTION ON SEED PRODUCTION AND GERMINATION IN PANICUM VIRGATUM L. (SWITCHGRASS)
Brooke Desposato
Plant Sciences, Oral Presentation
Section: 4, 12:15 PM, Room 36
Presentation Number: 846
Mentor(s): Carolyn Malmstrom

Switchgrass Mosaic Virus (SwMV, +ssRNA, family Tymoviridae, genus Marafivirus) is a wild virus that infects *Panicum virgatum L.* (upland switchgrass). A current study in the Malmstrom lab found that SwMV has reduced fitness components of *P. virgatum* tillers height, biomass, and panicle development (Ryskamp and Malmstrom, unpublished). This study supported and added to Ryskamps' research by combining field measures and greenhouse experiments. The goal was to determine the negative effects of SwMV has on *P. virgatum* seed mass, and seed germination comparing symptomatic and non-symptomatic switchgrass tillers. Significant results found higher panicle mass, panicle height, number of seeds, and total seed mass for non-symptomatic tillers. This study will aid in advancing and understanding the intergenerational effects of this virus on components of fitness and germination.

PSYCHOLOGY

THE EFFECT OF PERCEIVED SOCIAL MEDIA STATUS ON THE RELATIONSHIP BETWEEN EMPATHY AND CYBER AGGRESSION
Alyssa Kaminski, Christine Lee, Brandi Randall, Dasia Dawson
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 394
Mentor(s): Alex Burt

Numerous studies have documented the significant negative relationship between empathy and bullying behavior among youth, which has led to the development of several prevention and intervention programs designed to increase empathy skills among youth who carry out aggressive behavior (Jolliffe & Farrington, 2006; Noorden, Haselager, Cillessen, & Bukowski, 2014; Sahin, 2012). However, there is limited research examining the relationship between empathy and cyber aggression, defined as intentional acts of aggression perpetrated through an electronic medium (Slonje & Smith, 2008). To investigate whether this association persists in an online realm, the current study examined the relationship between self-reported empathy and cyber aggression among a sample of 358 college students. Additionally, given evidence suggesting that perceived popularity is positively associated with bullying behavior (Caravita, Blasio, & Salmivalli, 2009; de Bruyn, Cillessen, & Wissink, 2010; Vaillancourt, Hymel, & McDougall, 2003), the moderating effect of participants' social media friends/ followers was examined, conceptualized as a representation of online social status. Moderated regression analyses indicated that the relationship between empathy and cyber aggression was negative (β= -.21, p<.05), and that this relationship was stronger in those with high numbers of social media followers. These findings have important potential implications for intervention strategies for cyber aggression among youth, and they highlight the need for further research to examine the role of perceived social media status in the perpetration of aggressive online behavior.

PREDICTING ADOLESCENT SELF-HARM FROM PARENT-ADOLESCENT AGREEMENT ABOUT ADOLESCENT MOODS
Paige Girdley, Sabrina Cleis, Alana Havens
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 395
Mentor(s): Susan Frank

Previous studies have demonstrated that agreement is low across informants in regards to reports of adolescent behavioral and psychosocial impairment. It is known that agreement is particularly low for reports of internalizing symptoms, i.e. depression symptoms, and that general disagreement in parent-adolescent relationships tends to have a negative effect on the adolescent. As such, the present study set out to investigate how agreement between parent- and self-reports of adolescent negative affectivity and functional impairment moderate adolescents' involvement in self-harm behaviors. We analyzed data from outpatient intake questionnaires completed by 115 parent-adolescent pairs. Results suggest that both adolescent- and mother-reports of adolescent negative affectivity can be used to predict

adolescent-reported self-harm behaviors. However, no significant effects of mother-adolescent agreement, father-report, or father-adolescent agreement were identified.

THE EFFECTS OF NAPPING ON THE CONSOLIDATION OF GENERALIZED LEARNING OF SYNTHETIC SPEECH
Maddie Bross, Islam Said, Riti Singh
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 396
Mentor(s): Kimberly Fenn

Learning a new language requires the ability to decipher and retain novel sounds in order for successful communication to occur. Previous research has shown that a night of sleep consolidates learning of novel speech sounds and that a 90-minute nap can prevent loss of learning. In the current experiment, we are investigating the extent to which a short midday nap assists in the consolidation of generalized learning of synthetic speech. Participants were trained on synthetic speech in the morning and given an immediate posttest. They returned in the afternoon and were randomly assigned to take a 30-minute nap, a 60-minute nap, or no nap. During the nap, we recorded neural activity using polysomnography to assess quantity and quality of sleep. Participants returned in the evening for a final posttest on novel words. Data collection is ongoing but we will compare performance between participants who napped and those who did not nap. We expect to replicate previous findings such that participants who nap will be better able to decipher distorted speech than those who do not nap. We further predict that the amount of slow wave sleep and sleep spindles will predict performance in the nap groups. These results will demonstrate that even short periods of sleep are sufficient for consolidating generalized learning of synthetic speech. This work could suggest that short periods of sleep aid in speech learning and could have important implications for theories of speech and language learning and memory consolidation.

THE EFFECT OF BRIEF MINDFULNESS TRAINING ON ERROR RECOGNITION: AN ELECTROPHYSIOLOGICAL STUDY
Ling Peng
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 397
Mentor(s): Jason Moser, Yanli Lin

Mindfulness has been gaining traction as a self-help and therapeutic technique given research suggesting its benefits in areas such as academic performance, workplace effectiveness, and other stress-inducing situations. Underlying these benefits is the notion that mindfulness improves cognitive functioning, such as error monitoring. Error recognition, a specific aspect of error monitoring is conceptually related to mindfulness in that both are thought to involve conscious awareness. Previous research has linked a neural index of error recognition in an event-related brain potential (ERP) that manifests as a positive deflection in microvolt amplitude approximately 200-500 ms after an error is committed in electroencephalogram studies—the error positivity (Pe). Our previous research suggested that following a guided meditation exercise, participants experienced a greater difference in Pe amplitude compared to those who followed a control audio TED talk. Finding research to support this idea has been challenging due to inconclusive and contradicting methodologies across studies. To shed light on the methodological challenges inherent in mindfulness research, the present study examines the relationship between a mindfulness meditation intervention exercise and the late (i.e., Pe) neural index of error monitoring. Based on our previous findings, while controlling for potential confounds in methods, there will be no difference in Pe amplitude between two groups following a mindfulness meditation audio induction exercise versus a control audio induction exercise.

COLLEGE SUPPORT SERVICES FOR STUDENTS WITH ASD: IS THERE CORRESPONDENCE BETWEEN WHAT IS RECOMMENDED AND WHAT IS OFFERED?
Katie Sweeney
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 398
Mentor(s): Brooke Ingersoll

The transition to college involves increased independence and a more complex academic and social environment. These demands can be particularly challenging for students with autism (ASD), who exhibit unique difficulties with social communication and restricted and repetitive interests and academics. As more individuals with ASD attend college, there has been a growing focus on supports for students ASD, both in the research literature as well as in University Disability Offices. This mixed-method research project will examine ASD support services from multiple perspectives, with the aim of understanding the degree to which current four-year colleges and universities provide the supports for college students with ASD to be successful. This project will conduct a systematic review of the literature to determine the recommended best practices in college supports for students with ASD. This framework will be used to analyze services offered to students with ASD at four-year colleges and universities in the Midwest (Michigan, Ohio, and Illinois). Services offered will be examined using content analysis of disability services websites for each college/university. This information will be compared with data from a survey of college students with ASD in the Midwest examining service use and satisfaction. This information will be integrated to determine the degree to which colleges provide best practices in ASD support services, as well as the degree to which students access these services and perceive them to be helpful. We expect that colleges/universities will offer academic modifications consistent with best practices, but will be much less likely to offer transition, social, and independence supports. Determining what supports and services are perceived as being most helpful will eventually allow academic institutions to more effectively serve students with ASD.

GENETIC ETIOLOGY AND TYPOLOGIES OF ALCOHOL USE DISORDERS IN COLLEGE STUDENTS
Megan Nicholson
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 399
Mentor(s): Bradley Verhulst

Understanding the etiological factors that culminate in alcohol use disorder (AUD) in college students is particularly important, as alcohol use is highly prevalent among college students. Alcohol use in college tends to be more frequent and extreme, with 44 percent of college students reporting engaging in binge drinking in the past two weeks. Approximately 20 percent of college students meet diagnostic criteria for AUD. The availability of alcohol on college campuses across the US is relatively high, contributing to high rates of drinking, despite that most students are under the legal age of consumption. The college atmosphere increases exposure to peer drinking and surrounds students with more positive attitudes towards drinking, which are the highest correlates for alcohol related behaviors in college students. Alcohol consumption elevates risk of long-term cognitive impairment, domestic violence, suicide, automobile accidents, and alcohol related diseases, including AUD, which correspond with impulsive behaviors that are routinely associated with heavy alcohol use. AUD is approximately 50 percent heritable, with molecular genetic factors providing a more nuanced representation of the genetic etiology. There are multiple typologies that may be used to describe alcoholism, and many share commonalities in their categorizations. The predominant types of alcoholism across the typologies are anxious-dependent types and antisocial personality types. In this project we will explore the differential environmental and genetic risk factors that predispose individuals to distinct typologies of alcohol use disorders.

BIOLOGICAL SENSITIVITY TO CONTEXT THEORY: EARLY LIFE STRESS AND SYMPTOMS OF BIPOLAR DISORDER
Carolyn Andrews
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 400
Mentor(s): G Bogat, Joseph Lonstein

Extant research on childhood-onset bipolar disorder (CBP) focuses on the importance of early life stress (ELS). However, little is known about the biological underpinnings of the relationship between ELS and CBP. The few studies that have examined this relationship find little or no significant results. Biological sensitivity to context theory (BSCT) suggests there are distinct subgroups of individuals for whom heightened biological response to challenge (e.g., cortisol

responsivity) can be risk-augmenting or risk-protective depending on their developmental environment. Such subgroups cannot be detected by the methods prior researchers have employed. This study uses a person-oriented approach (which can find subgroups) to examine the relationship between ELS, cortisol responsivity, and symptoms of CBP. Participants were 10-year-old children and their mothers (n=119, 42.7% white, 22.8% African American, 21.8% multiracial, 12.7% other; monthly income M=$3,196). Mothers completed questionnaires and children completed the Trier Social Stress Task to elicit a cortisol response. Latent profile analysis identified three profiles of individuals with varying levels of ELS and cortisol responsivity. Consistent with BSCT, individuals with high levels of ELS and high cortisol responsivity experienced significantly more depression symptoms than individuals with low levels of ELS and low cortisol responsivity. Individuals with high levels of ELS and low cortisol responsivity had significantly more mania symptoms than individuals with low levels of ELS and low cortisol responsivity. These findings underscore the importance of utilizing person-oriented approaches to examine the etiology of CBP. Identifying subgroups of children will allow us to develop the most appropriate interventions.

EXAMINING THE RELATION BETWEEN CAREGIVER CONSISTENCY AND RECIDIVISM IN A SAMPLE OF JUVENILE SEX OFFENDERS
Ema Smith
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 401
Mentor(s): Caitlin Cavanagh

Rates of reoffending for juvenile sex offenders are often lower than non-sex offenders at 7% and 43%, respectively (Caldwell, 2010). However, examining factors related to juvenile sex offenders' reoffending is no less important. The present study examines the role of caregiver consistency as measured by the Juvenile Sex Offender Assessment Protocol (JSOAP) at a Midwestern Family Court to answer the question, is there a significant relation between caregiver consistency and recidivism among a sample of juvenile sex offenders? The hypothesis is that there will be a negative relation between caregiver consistency and recidivism, such that as caregiver consistency increases rates of recidivism will decrease. This study could help juvenile courts better target programming and allocate finite resources.

LANGUAGE AND IMPRESSION MANAGEMENT OF ADDICTION DISCLOSURE IN HIRING SITUATIONS
Lauren Bernhardt
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 402
Mentor(s): Ann Ryan, Danielle Gardner

Despite addiction being considered a disease in the DSM-5, the condition remains highly stigmatized, especially in the professional world and hiring situations. Given this stigma, it is likely that individuals with addiction may feel a need to manage impressions regarding their condition. Therefore, the purpose of the present study is to better understand applicants' strategies used when disclosing and describing their addiction in hiring scenarios. Specifically, we seek to investigate whether the language used to describe addiction in such situations falls into established frameworks of identity management--including apologizing, excusing, or apologizing for behavior--or alternatively, if new frameworks may need to be developed to apply to this context. To accomplish this, we will recruit around 100 employed adults through Amazon's Mechanical Turk platform who have disclosed addiction within a hiring scenario. Participants will be tasked with describing their disclosure experience, in addition to completing a number of measures. Results will speak broadly to the various impression management strategies used by individuals with addiction as they pursue employment.

TO HELP OR NOT TO HELP: GENDER DIFFERENCES IN PEER MENTAL HEALTH INTERVENTION
Lauren Crymes, Madeline Elliott, Megan Jursch
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 403
Mentor(s): Jonathan Weaver

Gender has a significant impact on receiving help for a mental illness. Overall, men are less likely to seek and receive help for mental health concerns compared to women. In the current study, we examined the likelihood of helping a friend who has a mental illness that is either gender stereotypical or non-stereotypical. Participants read six vignettes that described either a female or male friend who exhibited symptoms of mental illness. Two mental illnesses were

previously rated as masculine, two were rated as feminine, and two were rated as gender neutral. Participants then rated the likelihood of engaging in various helping behaviors for their friend. We hypothesized that participants would be less likely to help a male friend, as opposed to a female friend, based on the enhanced mental health stigma associated with masculinity. However, participants were equally as likely to help male and female friends, but men reported being less likely than women to help a friend of any gender. Men also reported being more likely to assume that their friend was fine, despite the signs of mental illness. These findings may tie into research looking at the precariousness of masculinity. Discussion of mental illness, a culturally feminine topic, has the potential to cause a loss in manhood status. We've continued this discussion with men through a video. Traditional male socialization does not involve asking for and receiving help for mental health concerns, which could reduce a man's comfort level and effectiveness in giving help to a struggling friend.

COGNITIVE CONFLICT ENHANCES MATHEMATICAL EQUIVALENCE LEARNING WITH GESTURE
Katerina Levy, Chris William
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 404
Mentor(s): Kimberly Fenn

American students perform lower in math and science than their peers in other advanced countries and improving STEM learning is a critical need in our society. Prior research has shown that hand gesture during instruction facilitates learning and consolidation of mathematics. However, the mechanism by which gesture facilitates learning remains unclear. Gesture may help create better conceptual understanding. If so, then information that highlights structural differences between new learning and old knowledge should enhance learning without gesture. Thus, we investigated the effect of cognitive conflict on learning with or without gesture. We recruited third graders students (n=281) and provided instruction in mathematical equivalence on a classroom-wide level. Each classroom was randomly assigned to receive instruction with gesture or instruction in speech alone. Students watched videos that provided instruction on solving mathematical equivalence problems (8+3+4 =_+ 4). After each video, children solved an equivalence problem. After training, students solved basic arithmetic problems (e.g. 4+5+3=_) oriented horizontally, which should highlight structural differences between arithmetic and mathematical equivalences or vertically (control). Children then completed a posttest containing equivalence problems. One day later, they completed a second posttest. We predicted that students who learned with gesture would show better performance on both posttests and that solving horizontal problems would further enhance performance in students who learned with gesture. This work has the potential to increase understanding of the mechanism by which gesture facilitates learning and inform teaching practices in STEM education. Ultimately, we hope to use this work to improve early mathematical learning.

THE RELATION BETWEEN TRAUMA AND EMPATHY IN JUVENILE OFFENDERS
Rebecca Flynn
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 405
Mentor(s): Caitlin Cavanagh

Past studies suggest great prevalence of prior trauma amongst juveniles who are incarcerated (Abram 2004). Less known, is the relation between trauma and youth who are never detained, the majority of juvenile offenders (Wilson 2013). The purpose of this research is to examine the relationship between prior trauma and criminogenic risk factors captured by the assessment, J-SOAP-II. The hypothesis is that, as scores of prior trauma increase, the youth's capacity of empathy will decrease. This study may help shed light on the prevalence of trauma among juvenile offenders and help courts appropriately address youth with traumatic experiences.

IMPLICIT ATTENTIONAL BIAS FROM SELECTION HISTORY
Ryan Riger
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 406
Mentor(s): Susan Ravizza

Two established modes of attention are bottom-up and top-down processing. Bottom-up processing is automatic attention to a stimulus that stands out, such as a loud noise, and top-down processing is a voluntary mode of attention wherein a person willfully directs their attention. A newly suggested third mode, however, is selection history, which

occurs when a certain stimulus or feature is selected repeatedly and continues to draw attention in future encounters. To test the conditions under which this third mode can alter attention, we set up a series of experiments using a visual search task. Participants looked for a target among distractors and made a judgment about the target (length or orientation). In the training phase, targets were presented in one color more often than the other. In the test phase, targets appeared equally in both colors. We predicted that the high probability color would still be prioritized in the test phase even though it was no longer more prevalent. We also expected that this would be an implicit process, meaning it would be occur regardless of whether participants were aware the probability differences. Faster reaction times were consistently recorded for the high probability color, even during the test phase. Thus, our experiments demonstrated persistent biases to attention from frequent selection attributable to selection history.

VIRAL TRACING ANALYSIS OF ORBITOFRONTAL CORTEX PROJECTIONS TO ROSTRAL VERSUS CAUDAL BASOLATERAL AMYGDALA
Mansi Verma, Shangari Varatharajan
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 407
Mentor(s): Amy Arguello

Viral-tracing methods allow for visualization of monosynaptic neuronal circuitry. When combined with detection of neuronal activity (i.e. via detection of Cfos protein expression), viral tracing methods can reveal whether specific neuronal projections are preferentially activated. Previous studies in our lab have shown increased neuronal activation in the orbitofrontal cortex (OFC) in a rodent model of cue-induced drug relapse. However, there is less known about the monosynaptic OFC targets to the rostral versus caudal basolateral amygdala (BLA). To distinguish between orbitofrontal targets to rostral versus caudal BLA, we stereotaxically infused a combination of viral vectors into those subregions. A retrograde tracer (AAV5.CMV.HI.eGFP.Cre.WPRE.SV40) was bilaterally infused into the rostral or caudal BLA and a Cre-dependent fluorescent reporter (AAV5.EF1a-DIO-eYFP-WPRE-hGH) was infused into the orbitofrontal cortex. Therefore, only neurons in the OFC that received retro-transported Cre would then express the reporter protein. Following 3-4 weeks of post-surgical recovery, rats were perfused, tissue sectioned and processed for fluorescent analysis. We observed robust expression of the Cre-dependent reporter protein in the OFC of rats that received retro-Cre in either the rostral or caudal BLA. Future studies are aimed at quantifying potential differences in reporter protein expression in the OFC dependent on rostral versus caudal BLA targeting.

IS THERE EVIDENCE OF A "FERGUSON EFFECT" ON CRIME IN THE UNITED STATES?
Pero Dagbovie
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 428
Mentor(s): Joseph Cesario

Following the killing of Michael Brown in Ferguson, Missouri and the ensuing chaos, social commentators introduced the idea of the "Ferguson Effect." This effect claimed that the increased public scrutiny of police officers following police shootings results in higher crime rates. Although some past work has attempted to study this effect, past efforts have been limited to one or two cities and have had problems with measurement of crime rates. The current research tests for evidence of one model for the Ferguson Effect: that the increased scrutiny of police officers' dealings with black communities causes officers to disengage from discretionary policing methods and, as a result, crime rate increases. I will test whether changes in national discretionary policing data have corresponded to changes in national crime rates. The two major strengths of this work are (1) the use of over-time data across a large number of U.S. cities, and (2) a measure of crime that is independent of policing data (death by assault data from the CDC).

SIMPLE CELL COUNTER-MEDIATED ANALYSIS OF DRUG-SEEKING INDUCED NEURONAL ACTIVATION IN THE PREFRONTAL CORTEX
Aneesh Bal
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 429
Mentor(s): Amy Arguello

A common method utilized to assess changes neuronal activity involves the quantification of immunoreactive (IR) cells. While quantification of IR-cells provides valuable information on the potential brain regions and cell types involved in external-related plasticity, manual quantification of cells remains time-intensive and can be prone to subjective bias. Automated methods utilized for counting include: CellProfiler, ImageJ EdgeDetection, OpenColonyFormingUnit (OpenCFU), U-net. However, the accuracy of these automated methods is dependent on homogenous cell size, oversampling, and varying pixel intensity. In order to implement an automated counting method for Cfos-IR cells, we have created a novel cell counting method, called Simple Cell Counter (SCC). To test the accuracy of SCC in quantifying Cfos-IR cells, we analyzed a data set from a previous experiment in which rats underwent cocaine self-administration where cocaine infusions were paired with contingent cues. Following extinction training, in which lever responses resulted in no cues or drug infusion, rats underwent a 1-hour drug-seeking test in response to the previously drug-paired cues. Rats were perfused and tissue was sectioned and stained for Cfos protein. Cfos-IR cells were manually quantified in over 600 images taken from the prefrontal cortex. Manual counts revealed that drug-seeking behavior elicited an increased in the number of Cfos-IR cells in the prefrontal cortex. SCC-analyzed images also revealed similar magnitude of change in Cfos-IR cells, with no statistical differences compared to manual analysis. Furthermore, compared to manual analysis, SCC quantification was less time-intensive, allowed for efficient separation of overlapped cells, and minimization of background signal.

RISK AND NEED ASSESSMENT SCORES OF HUMAN TRAFFICKING VICTIMS
Blake Kocsis
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 430
Mentor(s): Caitlin Cavanagh

Human trafficking is a growing epidemic and "second only to illegal drugs" in terms of criminal profit (Feingold, 2010). However our understanding of human trafficking victims within the juvenile justice system is scarce. To expand our understanding, the current project will examine and compare risk and need assessments of suspected or confirmed human trafficking victims with assessments of juvenile offenders overall to identify differences and similarities between groups. The sample used is risk assessment data collected from a juvenile court in Michigan.

PUPIL DYNAMICS AS A FUNCTION OF SCHIZOTYPAL TRAITS IN HEALTHY INDIVIDUALS
Alyssa Dinkins
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 431
Mentor(s): Katharine Thakkar

The pupil of the eye changes size with alterations in luminance. This dynamic is known as the pupil light reflex, and has been an area of interest in schizophrenia research dating back to the 1900's. Previous research has shown abnormal pupillary responses in schizophrenia, with differences thought to reflect alterations in the neurotransmitters acetylcholine and noradrenaline. These easily-collected pupillary measurements have the potential to bring about a deeper understanding of the mechanisms and pathways involved in schizophrenia; an understanding that may be utilized in the determination of psychopharmacological treatment for those affected. While schizophrenia research focusing on the differences in pupil dynamics is ample, it fails to address whether differences between patients and controls is due to the illness or the confounding effects of pharmacological treatment and/or psychosocial effects of their mental illness. Investigation of pupil dynamics as a function of schizophrenia-like (schizotypal) traits in healthy individuals bypasses these potential confounds. College undergraduates completed the Schizotypal Personality Questionnaire. In addition, dark-adapted pupil diameter, as well as the velocity and magnitude of pupil dilation and constriction were measured using a Pupillometer with built-in light stimulus protocols. Pupil dynamics were related to schizotypy measures. These results and their implications for interpreting altered pupil dynamics in schizophrenia will be discussed.

PUPIL RESPONSE TO AMBIGUOUS STIMULI
Ashley Depew
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 432
Mentor(s): Jan Brascamp

Under certain conditions, an observer's perception of an unchanging visual stimulus changes over time: the observer experiences periodic 'perceptual switches'. Because the stimulus itself does not change, it is of interest to ask: what in the brain causes perception to switch? This research aims to examine pupil responses associated with perceptual switches, because pupil responses can inform about the brain processes involved. Participants will be undergraduate and graduate students at Michigan State University, with demographics consistent with those of a large university in the Midwestern United States. All participants will experience four different conditions, twice each, of a behavioral experiment in which the task is either to report switches in the perception of a stimulus on a screen, or to omit these reports. In preliminary pre-processing of a small sample of data, perceptual switches appear to be associated with pupil constrictions, and pupil dilations to be associated with key presses in the event that the switches have to be reported.

EFFECTS OF PRENATAL TESTOSTERONE ON IMPULSIVITY AND LOSS OF CONTROL EATING IN ADOLESCENT GIRLS
Gagana Borra, Sarah Chaudhry, Skylar Dewitt
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 433
Mentor(s): Kelly Klump

Past animal research suggests a protective effect of prenatal testosterone on disordered eating; however, results in humans have been mixed. A potential reason for these equivocal findings might be that prenatal testosterone impacts traits that both decrease (e.g., sweet food preference) and amplify (e.g., impulsivity) risk for disordered eating. It may be the case that the hypothesized protective effects of prenatal testosterone on disordered eating in humans will be more evident after controlling for the relationship between prenatal testosterone and impulsivity. Understanding the nuances of prenatal testosterone's effects on disordered eating will provide additional insight into dysregulated eating behavior (e.g., binge eating and loss of control eating), and has the potential to guide future etiological research. The present study will analyze relationships between measurements of 2D:4D ratios (an indicator of prenatal testosterone exposure), scores on a self-report measure of impulsivity (UPPS-P Impulsivity Behavior Scale), and scores on a measure of loss of control eating (Loss of Control Eating Disorder Version) in archival data from same-sex female twins ages 11-15 (n=978). We plan to present our findings on whether the inverse relationship between prenatal testosterone exposure (represented by the 2D:4D ratio) and loss of control eating is strengthened after accounting for prenatal testosterone's effects on impulsivity.

INVESTIGATING THE SOURCE OF SUBSEQUENT SEARCH ERRORS
Andrew Dumont, Erynne Dixon
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 434
Mentor(s): Mark Becker

In medicine, radiologists frequently miss a second (different) indication of potential disease when two indications are present in the same scan. Recently, cognitive psychologists have sought to understand its cause. This phenomenon has been called Subsequent Search Misses (SSM), and has been studied using simple visual search tasks. These reports suggest that the magnitude of SSM increases when two targets have different features from one another, rather than when they are similar. One explanation for this phenomena is that people initially activate two search targets, one for each type of target. However, once one target is identified, it's representation becomes active in working memory and the representation of the second, different, target's features becomes inactive. This is known as the flux capacitor model. In the current study, we found evidence against this model using our own simple search task. Participants performed a visual search task where they identified T's and O's amongst offset L's and Q's. There were 4 conditions; trials with no targets, 1 target (T or O), 2 similar targets (TT or OO), or 2 different targets (TO). In addition to getting reaction time and accuracy data, we also eye tracked participants as they searched. We found no evidence in support of the flux capacitor theory, and we also suggest that the method previously used to analyze these types of data was inappropriate. Using a different analysis technique, we found that the observed reductions in accuracy were due to probability, as opposed to a subsequent search miss effect.

ROLES OF CONTRAST AND TOPICALITY IN NARRATIVE ENGAGEMENT OF MUSIC
Katie Edwards
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 435
Mentor(s): J McAuley

The roles of musical contrast and topicality in narrative engagement with music Heider & Simmel (1956) showed that humans have a natural tendency to narrativize abstract visual stimuli consistent of short animations of moving shapes (Heider and Simmel, 1956). In the domain of music, recent studies have similarly found that people have a robust tendency to imagine stories when listening to instrumental music (Margulis, 2017); moreover, the narratives that arise are remarkably consistent and often contain common underlying themes (Thompson & Balkwill, 2010; DeVries, 1991). The present study considered the relative roles of musical contrast (e.g., changes in tempo, loudness, harmony, and key) and topicality (culturally learned extra-musical associations). Participants from Michigan State University listened to eight one-minute long Western and Chinese excerpts, each featuring high or low levels of contrast and topicality. High levels of contrast and topicality were expected to result in a greater degree of narrative engagement than low levels of contrast and topicality. Preliminary results suggest that high topicality levels are associated with high levels of narrative engagement, especially for musical excerpts from one's own culture. Relatively little effect of contrast was found on narrative engagement. Results are discussed in the context of a larger cross-cultural project examining narrative listening in music.

RELIABILITY OF THE MYERS BRIGGS TYPE INDICATOR
Molly Griffin, Jeremiah Eaton
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 436
Mentor(s): Peter White

The Myers Briggs Type Indicator (MBTI) is a self report test that assigns one of 16 personality types that are represented by a four letter code. The personality types are defined by four distinct dichotomies comprised of extroversion/introversion, sensing/intuition, thinking/feeling, and judging/perceiving. The MBTI is administered by companies in the hiring process and individuals seeking self discovery. Many people believe the results of the MBTI have implications for career success and personal growth. In the study we investigated the efficacy of the MBTI in describing the personality of an individual using self identification as a metric. After completing the test, study subjects were presented with 20 descriptive statements, five of which distinctly reflected their own personality type and one drawn from each of the remaining 15 personality types. Subjects choose five descriptive statements that they most identified with and received a score ranging from 0-5 depending on the number of chosen statements that matched their assigned personality type. This study consisted of 30 participants from a variety of demographics. Our results demonstrate the practicality of the test for individual use and self discovery.

NAPPING MAY MITIGATE THE EFFECTS OF SLEEP DEPRIVATION ON SUSTAINED ATTENTION AND MEMORY MAINTENANCE
Nataly Dawood
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 437
Mentor(s): Kimberly Fenn, Michelle Stepan

Sleep deprivation impairs cognitive functioning and attempts to mitigate deficits associated with sleep loss have had mixed success. In a previous study, we found that sleep-deprivation impaired sustained attention and memory maintenance. Caffeine mitigated attention deficits but had no effect on memory maintenance, suggesting that caffeine benefits lower-level, but not higher-level cognition. The current study investigated if a brief nap mitigates the deleterious effects of sleep deprivation on lower-level and higher-level cognitive functioning. In the evening, participants completed tests of memory maintenance (UNRAVEL) and attention (Psychomotor Vigilance Task, PVT) and were randomly assigned to stay awake overnight in the lab or sleep at home. Participants who stayed awake were randomly chosen to take a 30 min nap, 60 min nap, or no nap. Nap participants were set up with partial polysomnography, which involved placing small sensors on the face and scalp to measure quantity and quality of sleep. In the morning, rested participants returned and all participants completed UNRAVEL and PVT. We predicted that sleep-deprived participants who napped would have fewer attentional lapses on the PVT and make fewer memory maintenance errors on UNRAVEL,

and that the effects would be stronger for those who napped for 60 min. We further predicted participants who obtained more slow wave sleep would make fewer lapses and fewer memory maintenance errors. Thus, brief naps may be able to benefit aspects of both lower-level and higher-level cognition when sleep deprived.

EXAMINING THE RELATIONSHIP BETWEEN THE STABILITY AND FLUCTUATION OF HORMONES AND MOOD ACROSS THE MENSTRUAL CYCLE
Madison Marras, Paula Guzman
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 438
Mentor(s): Jason Moser

Currently, there is very little known about the relationship between ovarian hormones (i.e., estradiol and progesterone) and mood symptoms across the menstrual cycle in naturally cycling women. In addition, there is uncertainty regarding whether average hormone levels relate to mood stability, or whether fluctuations in hormones relate to mood fluctuations. To better understand this relationship, the aim of the current analysis was to examine mean levels and standard deviations of hormones and mood, and their relations across the menstrual cycle. A total of 66 naturally cycling women between the ages of 18-25 completed daily measures of mood - worry, anxious arousal, and anhedonic depression ? across 35 days of their cycle. They also provided daily assays of saliva from which estradiol and progesterone were extracted. Regression analyses were conducted to examine whether mean levels of estradiol and progesterone predicted mean levels of each mood measure, as well as whether, instead, fluctuations (standard deviations) of these hormones predicted fluctuations (standard deviations) in mood. We found that mean levels of estradiol and progesterone, as well as their interaction did not significantly predict any mood measures. However, a significant interaction between fluctuations (i.e., standard deviations) in hormones was found to predict worry only, such that women with high fluctuations in both estradiol and progesterone also experienced high fluctuations in worry. These findings provide an initial understanding as to the importance of considering fluctuations in both hormones and mood in the study of the role of hormones in anxiety and depression.

THE INTERGENERATIONAL CONNECTIONS BETWEEN PARENT MONITORING AND PARENT PERCEPTIONS AND EXTERNALIZING BEHAVIOR IN CHILDREN
Kamryn Holtz
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 439
Mentor(s): Allison Gornik, Evan Tacey, Catherine Durbin

Poor parental perceptions and increased parent monitoring have been associated with poor impulse control, increased aggression, and delinquent behaviors. Prior research has primarily focused on adults reflecting on their own parenting practices and comparing it to how they were raised rather than investigating how their children perceived their parenting. However, the use of recollections creates a need for longitudinal research to eliminate memory bias about past parenting decisions and practices. The current study aims to examine the effects of parental monitoring on childhood behavior, as well as the transmission of intergenerational parental perceptions by utilizing a parental monitoring questionnaire. In order to accurately assess the continuity of parental perceptions, we utilized a sample of three generations of high-risk families. We compared the ways in which Generation 2 perceived Generation 1, and how Generation 3 perceived Generation 2 with regard to parental monitoring and externalizing behaviors. We hypothesized that there would be continuity in parental perceptions and that high levels of parental monitoring will be strongly associated with externalizing behavior in children. We found that the ways in which Generation 2 perceived they were monitored by Generation 1 was not linked to the way that Generation 3 perceived they were monitored by Generation 2. Additionally, we found that when parents reported their children had greater externalizing behavior problems, children reported higher levels of parental monitoring. These results indicate that the intergenerational connection between perceptions of one's parents is less established than the connection between children's externalizing behaviors and parent monitoring.

SUGGESTIONS FOR IMPROVING HEALTHCARE FOR TRANS & GENDER DIVERSE POPULATIONS
Cynthia Brown, Zoe Xu, Maryam Razzaq
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 440
Mentor(s): Jae Puckett

Transgender persons are marginalized in our society and often are not connected to necessary mental health and medical care resources due to stigma. In addition, many providers lack basic understanding of this population and their health needs, and as a result, transgender people often report poor healthcare experiences. Though the content of these reports is familiar within the community, providers are in need of concrete suggestions for how to improve the care that they provide to transgender individuals. Participants in the current study were asked to describe any recommendations they might have for medical/mental health providers to improve experiences of transgender individuals within these settings. Participants included 435 transgender and gender diverse individuals (ages 16 ? 73) who responded to an online survey. Thematic coding of these responses revealed five basic categories of suggestions (examples provided for each): trans accessibility ("There were only women's restrooms"); forms, papers, and preferences ("Ask about pronouns"); training ("All staff needs to be educated about trans issues, including genderfluid and nonbinary identities, and management needs to back up the patients."); basic respect and decency ("Please, listen to your patients. Transgender people know who we are, and what we want."); and professional suggestions ("Consent for all physical contact."). These results provide a better understanding of transgender experiences in healthcare and a more useful, comprehensive compendium of the ways in which transgender individuals suggest their healthcare be improved. These findings can aid in the development of better professional healthcare practices for this historically stigmatized and underserved population.

THE RELATIONSHIP BETWEEN JOINT ATTENTION AND LATER COMMUNICATION SKILLS ACQUISITION IN CHILDREN WITH AUTISM SPECTRUM DISORDER
Grace Macdonald
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 441
Mentor(s): Brooke Ingersoll

This research project focuses on the relationship between joint attention skills and later acquisition of communication skills in children with Autism Spectrum Disorder (ASD). Previous research has demonstrated that initiating and responding to joint attention strongly predict later language skills during the early stages of language development. This research looked at long-term changes after a few years, but has not addressed short-term language gains after a few months. Sixty children with ASD between the ages of 1.5 and 8 enrolled in two parent-mediated social communication intervention studies completed assessments that evaluated joint attention skills (Early Social Communication Scales [ESCS]; Mundy, 2003) and adaptive functioning (Vineland Adaptive Behavior Scales [VABS]; Sparrow, Cicchetti, & Balla, 2005). We will analyze the correlation between early joint attention behaviors from the ESCS and later communication and socialization domain scores from the VABS. We predict that children with ASD who perform more joint attention behaviors on the ESCS at intake will make greater gains in communication and socialization domains on the VABS in response to intervention. The conclusions of this study can shift the focus of intervention programs to joint attention skills, such as alternating eye contact, and following eye gaze or a point, since children with ASD have deficits in joint attention skills. Further research might look at facilitating the process of acquiring communication skills by targeting joint attention behaviors.

PUPILLOMETRY AS A TOOL FOR UNDERSTANDING SCHIZOPHRENIA
Jessica Fattal
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 253
Mentor(s): Katharine Thakkar

The negative symptoms of schizophrenia, which include things like apathy, asociality, and anhedonia, have remained largely untreated and misunderstood in clinical settings due to the lack of understanding of underlying pathophysiological mechanisms, leaving patients with a low quality of life even after treatment. To address this problem, recent studies have found pupil size changes useful as an indicator of cholinergic and noradrenergic activity in the brain. These neurotransmitters play a crucial role in cognition and motivation, both of which are impaired in schizophrenia and

central to the so-called negative symptoms. A handful of older studies have shown abnormalities in the pupil light reflex in individuals with schizophrenia; however, these studies were not done using rigorous pupillometric measurements, nor were abnormal pupil dynamics related to relevant clinical variables. In our study, we sought to investigate two major questions: 1) Do the dynamics of the pupil light reflex or baseline pupil size differ between healthy controls and individuals diagnosed with schizophrenia; 2) Are pupil measurements related to clinical symptoms. We collected the dark-adapted pupil diameter and velocity and magnitude of pupil dilation and constriction in both patients and healthy controls. These dynamics were correlated with different factors of schizophrenia, calculated using diagnostic surveys and interviews. Given that pupil dynamics may provide a window into neuromodulatory function, our findings may shed light on the physiological mechanisms of clinical symptoms, which has implications for treatment development. Furthermore, pupillometry may serve as a useful assay of risk or predictor of treatment efficacy in clinical populations.

VIRTUAL REALITY FOR NEURODEVELOPMENTAL DISABILITIES: AN ANALYSIS OF CURRENT APPLICATIONS
Viktor Ilyasov
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 254
Mentor(s): Marisa Brandt

Dating back to the early works of Strickland in the 1990s, virtual reality (VR) has been undergoing research for its potential to benefit individuals who have autism and other neurodevelopmental disabilities. Since the early workings with this technology, many advances have developed, making VR more accessible and available for use in health and education settings. In recent years, there has been a great increase in research linking the technology to benefiting those with disabilities. However, with every technology comes costs and potential drawbacks. Based on a survey of research studies within the past decade, this analysis will focus on how virtual reality is currently being used amongst the autistic and intellectually disabled community. From there, it will provide insight into both the benefits and drawbacks of VR for aiding individuals with neurodevelopmental disabilities across these different approaches. Findings indicate a trend of technological acceptance towards VR and a growing interest for further usage of this technology amongst the individuals who have disabilities. However, studies also indicate that further research may be required in order to fully understand whether this technology benefits individuals greater than alternative methods.

THE LONGITUDINAL EFFECTS OF CHILDHOOD EXTERNALIZING PROBLEMS AND ADULT EXTERNALIZING PROBLEMS WITH PARENTAL ALCOHOL USE ON CHILD PERCEPTION OF ALCOHOL USE
Dalia Fragoso
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 255
Mentor(s): Allison Gornik, Evan Tacey, Catherine Durbin

While a substantial body of literature has examined concurrent associations between parent externalizing behaviors, parent alcohol consumption, and child alcohol consumption, longitudinal approaches have received less attention. A longitudinal study was conducted over more than 30 years, following parents and their children as these children grew into adults and had children of their own. First, this study compared childhood externalizing problem behaviors (e.g., aggression, rule-breaking) to the same individuals' levels of externalizing problem behaviors in adulthood. We found that when parents previously had greater levels of externalizing behaviors across childhood, they also self-reported greater substance abuse and general disinhibition in adulthood. Second, we compared parents' childhood perceptions of alcohol to the perceptions their current children; however, there was no relation between them. On the other hand, when children had a grandparent who had been involved in the legal system for alcohol-related offenses, children perceived that drinking alcohol caused significantly more negative emotions (e.g., anger) than children who did not have a grandparent with this experience. Third, we examined the concurrent associations between parent substance use and children's perceptions of alcohol. Results indicated that when fathers (but not mothers) reported greater substance use, children perceived alcohol use to cause more negative emotions as well as increase social interactions. The findings of this study conclude that externalizing behavior problems can have significant implications on an individual's functioning as well as the perceptions held by one's own children.

TAPPING TO SLOW RHYTHMS: A COMPARISON OF ADULTS WHO DO AND DO NOT STUTTER
Kelly Russell, Becca Vroegop, Alison Eberle
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 256
Mentor(s): J McAuley

Stuttering is a disorder that is notoriously difficult to treat - behavioral intervention can reduce symptoms, but no cure exists. Previous research has shown that children with developmental stuttering have a deficit in rhythm perception linked to the ability to internally-generate a beat (Chang et al., 2014; Wieland et al., 2015). This study investigated a potential rhythm processing deficit in adults who stutter (AWS) using a paradigm that specifically targets potential problems with internal beat generation. Age-matched control adults and AWS engaged in a synchronization-continuation tapping task in which they synchronized hand taps with a metronome presented at different time intervals, and then were asked to continue tapping at the same rhythm once the stimulus stops. Of particular interest was synchronization with slow rhythms, which is aided by internal beat generation. Continuous motion tracking methods were used to allow for a more in-depth analysis of tapping dynamics. Data was analyzed by observing how accurately each participant was able to synchronize with the stimulus during the synchronization phase and how much tapping variability was present during the continuation phase. Data collection is ongoing, but AWS are predicted to show reduced synchronization and continuation tapping performance compared to controls, particularly for slow rhythms. This would support the hypothesis that the rhythm perception deficit found in children persists in adults who stutter.

THE RELATIONSHIP BETWEEN PERCEPTUAL CHANGES AND PUPIL DILATION
Michael Wertheimer
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 257
Mentor(s): Jan Brascamp

During the summer months I worked with Dr. Jan Brascamp on a study to aid the discussion whether bi-stable perceptual changes cause pupil dilations. Bi-stable perception can occur when you have one stimulus presented to the left eye and another, different stimulus presented to the right eye which results in your perception switching between the two stimuli. These switches are known to be accompanied by a temporary increase in pupil size (pupil dilation), but there is debate as to what that means. The two relevant dissenting articles indicated that there were two viewpoints: 1) the pupil dilation is caused by the same neural processes that also make perception change, which would have implications for how those perceptual switches come about; or 2) the pupil dilation is instead due to the neural preparation of a key press via which an observer reports that his/her perception has changed. In order to study which option may be correct, a program was created in order to test, not only conventional binocular rivalry in which observers are tasked with reporting perceptual switches, but also binocular rivalry without a report task. In the tasks without report, we gave participants a probe task to keep them focused and to ensure proper data collection was taking place. In order to collect the relevant data an eye tracker was used to record both eye movements, pupil dilation, and perceptual switches. Participants were organized in a way to exhaust as many possibilities of the conditions presented to them.

THE EFFECTS OF MUSIC AND WRITING COPING STRATEGIES ON STRESS
Amelia Krause, Audra Knapp
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 258
Mentor(s): Robert Gray

Looking at the amount of stress collegiate students face daily, we assessed the impact of two popular coping mechanisms. Participants (N = 81) underwent a condensed version of the Triers Stress Test, a task in which each participant is told he or she will speak publicly and creates a short speech. Participants then used writing, listening to calming music, or no coping strategy to mitigate the effects of the stress-inducing task. To measure the baseline stress levels and changes throughout the experiment, three measurements of the participants blood pressure were given and compared across each of the groups. Finally, each participant completed reaction measures to assess their familiarity and comfort with the assigned coping strategy. We hypothesized that music would have a meaningful effect compared to the control and writing groups. Our overall findings overall were not statistically significant but did indicate listening to calming music may impact stress levels compared to writing coping methods.

EFFECTS OF PITCH CHARACTERISTICS ON PERCEIVED MUSICAL TEMPO
Becca Vroegop, Alison Eberle, Audrey Saggau-Drotos
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 259
Mentor(s): Leigh VanHandel, J McAuley

Listeners' perception of musical tempo is influenced by temporal and non-temporal factors. Boltz (1998) found that melodies with more contour changes are perceived to be slower than melodies with fewer contour changes. One explanation for this phenomenon is an imputed pitch velocity hypothesis whereby listeners are assumed to make use of pitch-velocity information when judging musical tempo; from this perspective, making a change in pitch direction requires slowing down, analogous to what would be required by a person running a zigzag course. The present study replicated Boltz (1998) using musical examples derived from Haydn Baryton Trios to examine whether similar effects of pitch are found for more ecologically valid (and less strictly-controlled) musical stimuli. Thirty participants listened to standard-comparison pairs of musical excerpts and judged whether the comparison excerpt was faster or slower than the standard. Melody pairs were presented so that the comparison either had more or fewer contour changes than the standard. In addition, comparison excerpts were presented at either the same, slower, or faster tempo than the standard. Consistent with Boltz (1998) and the imputed velocity account, melodic excerpts tended to be perceived to be slower when there were more contour changes than when there were fewer contour changes. In a separate study, the magnitude of these distortions was found to predict the tempo that listeners felt was the 'right' tempo for these excerpts. Implications for everyday music listening and more general aspects of auditory perception will be discussed.

ESSENTIAL(LY) INDIVIDUAL DIFFERENCES? PERSONALITY AND ESSENTIAL OIL USE
Lindsay Ackerman
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM, Ballroom
Presentation Number: 260
Mentor(s): William Chopik

Previous research has found an association between agreeableness and susceptibility to the placebo effect. In our research, we were intrigued by the real-world application of this finding, namely as it relates to the ever-increasing popularity of one of today's most widely used homeopathic remedies, essential oils. Does agreeableness predict use and purchase of essential oil remedies? Are people higher in agreeableness more likely to experience the proposed benefits of essential oil use? Are people lower in agreeableness less likely to experience the benefits? We also tested whether the association between agreeableness and essential oil use remains after controlling for other individual difference characteristics. In a survey study of over 500 individuals, we aim to provide insight into these questions.

THE ROLE OF GENDER ON THE RELATIONSHIP BETWEEN CYBERBULLYING AND CONTROL
Isabel Carley, Emily Quaine, Zehra Jaffar, Maria Martinez-Tejeda
Psychology, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 575
Mentor(s): Mikayla Kim, Alex Burt

Cyberbullying is a form of antisocial behavior expressed using digital technology. These aggressive acts range on a spectrum from sending mean emails or texts to spreading rumors online. Not surprisingly, past research has found impulsivity is a robust personality correlate of cyberbullying. It has been argued that impulsive individuals find it more difficult to restrain themselves when online bullying opportunities arise. It is not yet clear, however, whether gender affects this association. Previous research found males are generally higher on impulsivity and that their impulsivity often has more aversive outcomes (i.e., binge drinking, physical fights) than females, but literature on how this may affect cyberbullying perpetration is unclear. Our study sought to address this question by evaluating the moderating role of gender on the relationship between cyberbullying and Control (reverse-scored impulsivity) in a large sample of undergraduate students (N = 995). Results indicated that the association between Control and cyberbullying was stronger among men than women, such that males low in control were more likely to engage in cyberbullying than those high in control. Such findings suggest possible gender-specific personality correlates of cyberbullying.

WORKPLACE DISCRIMINATION AND HEALTH: A STUDY OF POTENTIAL MODERATORS
Ethel Xu
Psychology, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 576
Mentor(s): William Chopik

Although overt, explicit displays of discrimination in today's society are rarer, there are still many subtle and perceived ways in which vulnerable groups are discriminated against. In the workplace, in particular, employees can face discrimination due to a number of factors, such as their age, gender and race. The stress that arises from workplace discrimination can have a large impact on an employee's work attitude, their work and life satisfaction, and oftentimes whether or not they stay in a job. Workplace discrimination can also have a considerable influence on employees' short-term and long-term health. However, less is known about the factors that might mitigate or exacerbate the effects of discrimination on health. The current study focused not only on the links between workplace discrimination and health, and but also on the effects of potential moderators of the discrimination-health link (i.e., self-efficacy, Big Five personality traits, optimism, and coworker/supervisor support). People with high neuroticism, high extraversion and high agreeableness were more negatively affected by workplace discrimination than those low on neuroticism, extraversion, and agreeableness. Self-efficacy was found to be a protective factor, such that they had fewer chronic illnesses despite reporting high levels of workplace discrimination.

THREAT SEARCH
John Bigham, Dana Pontious, Katie Lord
Psychology, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 577
Mentor(s): Mark Becker

Prior literature has demonstrated that threat alters visual processing. When threatened, the brain sacrifices processing high spatial frequency (HSF) information in order to prioritize low spatial frequency (LSF) processing. Put simply, this means that when threatened, visual processing de-emphasizes details, processing a blurry image. The present study aimed to test a training method that takes advantage of this phenomenon by presenting trainees with degraded visual stimuli approximate to the processing that occurs under threat. To do this, three groups of participants trained on a search task prior to the introduction of threat. One group trained with HSF stimuli, one with LSF stimuli, and another with normal images. All groups were then tested on a block of search trials containing normal images, to establish a baseline. Afterwards, subjects were shocked, and told they may be shocked throughout the next test block, to induce a feeling of threat. We hypothesize that the group training with degraded (LSF) stimuli will most rapidly identify relevant objects under threatening circumstances, relative to those who trained with non-degraded (HSF/control) stimuli. If significant, these findings could have immense implications on training procedures for individuals who work in areas in which they are repeatedly exposed to high-stress, threatening situations.

STEREOTYPES OF TRANSGENDER INDIVIDUALS
Nikola Radisic
Psychology, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 578
Mentor(s): Ann Ryan

There is a lack of research on transgender individuals. While the stereotypes of men and women are well understood, how individuals view members of the transgender communities in the workplace is less clear. The purpose of this study is to shed light on some of the stereotypes impacting these employees on a daily basis. Using items by Prentice and Carranza (2002), we administered a bank of prescriptive and proscriptive gender stereotype items. Participants answered three blocks of questions associated with the following three groups: transgender individuals and individuals transitioning (female to male and male to female). After conducting the study, we expect to find liberals to be more accepting of transgender individuals then traditional conservatives. In addition to this, we believe that higher religiosity will be correlated with higher discrimination of transgender individuals. Furthermore, we expect minority groups to hold differing opinions of members of the transgender community. Finally, we believe that individuals who are younger are less likely to associate negative stereotypes with transgender individuals.

PSYCHOLOGICAL EMPOWERMENT AND SCHOOL ADMINISTRATOR TURNOVER
Anna Esenther
Psychology, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 579
Mentor(s): Jennifer Neal

It is widely known that teacher turnover is a problem in American schools, but the turnover of school administrators (j.e., principals and superintendents) has received far less consideration in the literature. The question of which factors contribute to the turnover of school administrators remains largely unexplored and the present study examines whether or not psychological empowerment is among those factors. Following Spreitzer's model of psychological empowerment in the workplace (1995), we consider empowerment to be a construct encompassing four components: meaning, competence, self-determination, and impact. Meaning refers to the extent to which individuals value their work, competence is their perceived efficacy, self-determination is the amount of autonomy they have with work decisions, and impact is their degree of influence over work outcomes. Randomly sampled Michigan superintendents and principals were surveyed in 2015 about the extent to which they felt their jobs reflected each of the four components of empowerment. An internet search was conducted in early 2019 to determine if the principals (N=248) and superintendents (N=132) remained in the same positions they held in 2015. This presentation will connect the psychological empowerment data from 2015 with the follow-up turnover data from 2019 using logistic regression to determine associations between psychological empowerment and school administrator turnover. We hypothesized that more empowered administrators would be less likely to leave their positions. This work is important because a better understanding of the drivers of school administrator turnover can inform education policy and help improve the retention of principals and superintendents.

PARENT ASD SUBTHRESHOLD TRAITS AND CHILD TEMPERMENT
Shelby Rosalik
Psychology, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 580
Mentor(s): Catherine Durbin

The broad autism phenotype (BAP) has been conceptualized as a sub-clinical form of autism spectrum disorder (ASD). This phenotype is more common among biological family members of individuals with ASD, and BAP and ASD have in common difficulties with communication and social skills (Sucksmith, Roth, & Hoekstra, 2011). BAP traits include rigid and aloof personalities as well as pragmatic language skill difficulties (Losh, Childress, Lam, & Piven, 2008). However, BAP is not well understood in terms of how it is related to typical dimensions of adult personality or its implications for the traits of typically-developing offspring of parents with BAP traits. This study used a family design to explore how the BAP in parents is linked to both normal range and abnormal aspects of their own personality, as well as the temperament traits of their children. It is expected that the parents who show subthreshold autism related traits, as measured by a self-report measure of the BAP, will have children that display different patterns of temperament traits than offspring of parents low on the BAP. This is valuable information in that it will shed light on the possible familial link between BAP traits and normal range traits in offspring.

BARRIERS TO ADVANCEMENT IN ORGANIZATIONS FOR WOMEN AND ASIAN AMERICANS
Qi Huang
Psychology, Poster Presentation
Section: 6, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 581
Mentor(s): Ann Ryan

Intersectionality theory explains that the overlap of multiple categories of social identities including gender and ethnicity can contribute to discrimination experienced by individuals (Cole, 2009). Also, the role congruity theory indicated that a group with certain characteristics will be positively evaluated when its characteristics are aligning with that group's typical social roles (Eagly & Karau, 2002). Stereotypes regarding women as communal (e.g., understanding, selfless, nurturing; Eagly & Steffen, 1984) are incongruent with the stereotype of a leader as predominantly agentic (e.g., assertive, decisive, independent). Common stereotypes against Asians including that Asians are highly competent and hard workers but lack interpersonal skills (Lin, Kwan, Cheung & Fiske, 2005) make this group less likely to be placed in leadership positions. This project aims to integrate role congruity and intersectionality theories to explore the barriers to advancement in organizations for women and Asian Americans. In this study, 238 participants were recruited through

Michigan State University's (MSU) HPR pool and randomly assigned into one of the 8 conditions. Participants read a job description for a leadership position as well as applicants' LinkedIn profiles and provided ratings of the candidate. Within the experiment, applicants' intersectional category (Caucasian male, Caucasian female, Asian male, Asian female) was manipulated via a photo and name. Within the leadership job description, job type (female-dominated: social work manager; male-dominated: engineering manager) was manipulated. Results showed that female applicants are perceived as warmer, more qualified and more favorable than male applicants. Applicants applying for Social Work Manager is rated more competent and warmer than applicants applying for Engineering Manager position.

THE EFFECT OF NEGATIVE AFFECT AND RELATIONSHIP STATUS ON PROBLEMATIC DRINKING PATTERNS
Desiree Brown, Rose Artman, April Burling, Ali Tarhini
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 582
Mentor(s): Sarah Carroll

Negative affect, or tendency to experience negative emotions such as irritability, guilt, and fear, has consistently been associated with problematic alcohol use. A separate body of research has identified marriage as a buffer against heavy alcohol consumption. Because existing studies have examined negative affect and marital status separately as predictors, it is unclear whether they increment one another or interact in their prediction of alcohol consumption. Additionally, extant studies have primarily used marital status as an index of romantic involvement. Less is known about the role of romantic involvement in younger populations, in which few people are married. The current study sought to fill these gaps in the literature by examining negative affect and romantic relationship status as predictors of problematic alcohol use in a college student sample. Michigan State University undergraduates (N=1012) completed a demographic measure that assessed romantic relationship status, the Positive and Negative Affect Schedule (PANAS), and the Alcohol Use Inventory. Using SPSS, we will conduct a multiple regression analysis to determine to what extent negative affect and romantic relationship status predict problematic drinking patterns, defined as frequency of binge-drinking. We hypothesize that negative affect and relationship status will both independently predict alcohol use, such that participants who report high levels of negative affect will report more frequent binge-drinking, and participants who are in exclusive romantic relationships will report less frequent binge-drinking.

WHAT DOES IT MEANS TO BE A MAN OR WOMAN? AN ANALYSIS OF THE SOCIAL CONSTRUCTION OF GENDER
Ash Boss, Taylor Anderson, Bella Andrus
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 583
Mentor(s): Jae Puckett

Living in a society where beliefs about gender have the potential to perpetuate bias leads to questions regarding the social construction of gender categories and how individuals perceive these categories. To further understand the way that gender is defined, we conducted a study evaluating the meanings of the gender categories of woman and man. This information could prove to be useful when examining the perceptions and treatment of transgender individuals because it may shed light on how cisgender people create boundaries around identity groups. In this study, a thematic analysis was conducted to identify what the subjects associate with the concepts of "woman" and "man." Participants were 360 cisgender individuals (63% women, 37% men; Mage = 31 years old) who took part in a 15 minute online survey. The preliminary findings indicate a range of responses for each identity label. The most commonly endorsed categories were related to social status and interpersonal dynamics. For example, men were described as "masculine" and "aggressive" and women were described as "kind" and "nurturing." Other categories related to defining these gender groups based on actions (e.g., "cook" for woman), labels (e.g., "protector" for man), and concepts (e.g., "feminism" for woman). This research may provide insight into how the binary genders of woman and man are constructed. This will help foster understanding of how bias is formed against those that do not fall into the hard and fast rules of binary gender.

ASEXUAL RELATIONSHIPS
Alexandra Brozowski
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 584
Mentor(s): Jonathan Weaver

Asexuality is generally defined as a lack of sexual attraction, but this does not necessarily imply a lack of sexual behavior or romantic attraction. In fact, asexuals do participate in romantic relationships. This study focuses on those asexuals currently in romantic relationships and how they experience them as a function of their identity. Specifically, this study focuses on how asexual identity and how the attachment orientation components of satisfaction, investments, and quality of alternatives correlate to romantic relationship commitment.

FEAR OF CRIME AND SATISFACTION WITH LIFE: THE MODERATING ROLE OF NEGATIVE AFFECT
Tasheena Williams, Aliceya Kenner
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 585
Mentor(s): Alex Burt

Satisfaction with life (SWL) is predictive of outcomes such as suicidality, physical and mental health, and longevity. Given the predictive utility of this measure for important life outcomes, it is critical to understand what factors influence SWL. Fear of crime has been found to predict satisfaction with life, such that individuals experiencing more fear of crime had lower satisfaction with life. Negative affect has also been found to be significantly associated with satisfaction with life in many individualistic nations, like the United States. Thus, this study intends to further understand the relationship between fear of crime and satisfaction with life by exploring the moderating role of negative affect. Our total sample is comprised of 1,781 participants (63% female, 33% male), ranging from ages 18-95. Data was collected via mailed questionnaires to individuals living throughout Michigan. Analyses will be conducted on SPSS using Andrew Hayes PROCESS. We expect negative affect to significantly moderate the relationship between fear of crime and satisfaction with life, such that fear of crime will be a stronger predictor of satisfaction with life among individuals with higher scores on negative affect. If our hypothesis is confirmed, it would point to the need for community-based interventions in high crime areas that aim to reduce negative affect.

IDENTITY CUES IN RECRUITMENT: DO DIVERSITY STRUCTURES AND ORGANIZATIONAL MINDSET INFLUENCE MINORITY APPLICANT PERCEPTIONS?
Justin Duby
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 586
Mentor(s): Ann Ryan

Traditional recruitment practices may fail to attract qualified applicants from marginalized groups. This may be due to organizations unknowingly emitting cues on organizational websites that signal identity threat to potential applicants from these groups. Previous research on identity cues in the recruitment context demonstrates that pictorial diversity stimuli on organizational websites results in marginalized group members viewing the organization as more attractive (Avery, 2003). The present study aims to consider additional cues that may influence the degree to which marginalized group members view the organization as a favorable place to work. Namely, we will investigate whether the number of diversity resources and the organizational implicit mindset affect marginalized group members' perspectives of the organization. In this project, we designed organizational websites manipulating the presence of organizational diversity resources (having either none, one or four) and organizational implicit mindset (growth or fixed). We hypothesize that a higher number of diversity resources will be related to an increased sense of perceived person-organization fit, greater willingness to apply, greater organizational attractiveness and organizational trust, and greater psychological safety and identity safety for applicants from marginalized groups. We also hypothesize that organizations that emphasize growth mindset will yield similar outcomes. Lastly, we hypothesize that a higher number of diversity resources and an organizational growth mindset will interact to allow for the greatest outcomes for applicants from marginalized groups. This research will help draw attention to novel cues that may influence marginalized applicants' perceptions of organizations.

THE TRANSITION TO PARENTHOOD: DOWN SYNDROME, MOOD DISORDERS AND SOCIAL MEDIA
Hannah Schultheiss
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 587
Mentor(s): Sarah Douglas

The transition to parenthood is filled with emotional and physical changes. This leads to a high likelihood of parents experiencing mood disorders such as anxiety and depression. Research has shown that parents of children with a disability often exhibit even higher rates of stress, depression, and anxiety. For parents of children with Down syndrome specifically, perinatal depression and anxiety can be a significant concern. These parents are expected to cope with the diagnosis and all the new information this entails, with very little emotional support outside of family members. Although a common occurrence, there is a lack of literature on the perinatal experiences of these parents and how those experiences impact their mental and emotional well-being. However, many of these parents are active on social media and in advocacy networks and use these outlets to discuss their experiences. This presentation will provide data and insights regarding perinatal depression and anxiety in parents of children with Down syndrome through examination of "birth stories" on parent social media (i.e. blog posts, Facebook, etc.). Stories of parent experiences relating to the time of diagnosis were found on social media by running various hashtags through the social media search engines. These social media entries were then extracted, de-identified, and analyzed using thematic analysis and inductive open coding as part of qualitative methodology. The main themes from the analysis will be presented, along with areas of future research.

SELF-DISCLOSURE MODERATES ASSOCIATIONS BETWEEN PARENTIFICATION AND ADJUSTMENT AND RELATIONSHIP QUALITY AMONG TYPICALLY DEVELOPING SIBLINGS OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDER
Megan Murrin
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 588
Mentor(s): Amy Nuttall

Typically developing siblings (TDS) of individuals with Autism Spectrum Disorder (ASD) often provide caregiving for siblings (sibling-focused parentification; SFP) or parents (parent-focused parentification). PFP is associated with TDS' depressive symptoms whereas SFP is associated with positive sibling relationships; social support buffers/enhances these associations. We extended this work to examine (N=108) self-disclosure to parents and friends, critical aspects of social support during emerging adulthood controlling for Broad Autism Phenotype, sub-clinical personality trait differences common among TDS, which may influence self-disclosure. Across outcomes, there were significant interactions with disclosure to parents and both PFP and SFP. High disclosure to parents was associated with risk to sibling interactions at high levels of SFP. However, high disclosure to parents enhanced well-being at low levels of SFP and was protective against risk at high levels of PFP. Results support the salience of continued relationships with parents during emerging adulthood.

PROBLEMATIC INTERNET USE AND PSYCHIATRIC SYMPTOMS IN SEXUAL MINORITIES
Marlee Maher
Psychology, Oral Presentation
Section: 8, 11:00 AM, Room 30
Presentation Number: 851
Mentor(s): Alytia Levendosky

Interest in the psychology of sexual minority individuals is expanding alongside society's growing tolerance of these lifestyles. It is understood that sexual minority individuals show increased symptoms of mental health disorders as compared to individuals who are heterosexual. This is likely linked to the discrimination and ostracization from peers and society. The stress endured by these individuals is thought to be a reason why sexual minorities spend a larger amount of time on the internet. However, increased time on the internet can lead to further psychiatric complications. This study aims to uncover the psychiatric symptoms associated with Problematic Internet Use in the sexual minority community. The sample consists of undergraduate students at Michigan State University who endorsed non-heterosexual status. Participants completed an online survey evaluating their "outness", anxiety symptoms, depression symptoms, alcohol use, and internet use. This research has three hypotheses. First, sexual minority problematic internet users (PIUs) will report greater symptoms of generalized anxiety disorder, depression, and alcohol use disorder than their non-

problematic internet user counterparts. Second, sexual minority men will report more significant psychiatric symptoms related to internet use than sexual minority women. Third, those sexual minority individuals who are less "out" than others will show greater mental health symptoms and greater symptoms of PIU. Data analyses will include regression and MANOVAs, as appropriate.

THE EFFECTS OF PRE/POST-NATAL INTERPERSONAL VIOLENCE ON INFANT TEMPERAMENT
John Chen
Psychology, Oral Presentation
Section: 8, 11:15 AM, Room 30
Presentation Number: 852
Mentor(s): Alytia Levendosky

Research on the perinatal period over the past several decades has shown that maternal experiences may have adverse effects on the development of the fetus, in utero and beyond birth (i.e. exposure to teratogens, malnutrition, tobacco smoking, binge drinking). A common stressor that has recently been studied on, intimate partner violence (IPV) during pregnancy, may affect the child and the child's temperament. This project seeks to understand how IPV, prenatally and postnatally, may affect the variability in temperament outcomes among infants. Using longitudinal data from the Michigan State University Prenatal Stress Study, we seek to implement a quasi-experimental design model to examine how IPV might contribute to differences in children's temperament. This is an ongoing longitudinal study, currently 60 women and their 6-month-old infants have completed the study. Approximately 50% of women were experiencing IPV when they enrolled in the study at 15 weeks of pregnancy. Women reported on IPV at three pregnancy interviews (15-17 weeks, 23-25 weeks, and 32-34 weeks) and at the 6-month postnatal interview. In addition, they reported on their infant's temperament at the postnatal interview. Data from all women and children who have completed the study by March 15 will be analyzed using hierarchical regression analyses to examine how pre and/or post-natal IPV affects infant temperament. Understanding the effects of perinatal IPV can incentivize health care providers, child-care providers, and NGO's advocacy for better policies and resources that could support families experiencing IPV.

DOES PERSONALITY PREDICT RECIDIVISM FOR WOMEN ON PROBATION OR PAROLE?
Jake Sadilek
Psychology, Oral Presentation
Section: 8, 11:30 AM, Room 30
Presentation Number: 853
Mentor(s): Deborah Kashy

Studies of the personality factors that may contribute to engagement in criminal behavior for people on probation or parole offer insights on the attributes of those who experience the most difficulty staying out of legal trouble. In contrast to the many studies that focus on male offenders, this study analyzes personality, criminal history, and recidivism data from 402 women involved in Michigan's Department of Corrections (MDOC). Data were collected longitudinally across a period of 66 months. Recidivism and criminal history data were gleaned from official records from the MDOC, and personality data were obtained from a series of self-report measures administered to the women. We hypothesized that higher levels of narcissism and impulsivity would be associated with increased criminal behavior. Regarding the big five personality characteristics (openness, conscientiousness, extraversion, agreeableness, and neuroticism), we hypothesized that agreeableness and conscientiousness would be negatively associated with criminal behavior. Results revealed a positive relationship between impulsivity and both criminal history and recidivism. Although a correlation between narcissism and criminal history was found, there was no association between narcissism and subsequent recidivism. None of the big five personality factors were related to criminal history or recidivism.

A SHOPPER'S JOURNEY: UTILIZING TOBII EYE-TRACKING TO UNDERSTAND CUSTOMER BEHAVIOR AND DECISION MAKING PROCESS IN PURCHASING PLANT MATERIAL
Mary Tuski
Psychology, Oral Presentation
Section: 8, 11:45 AM, Room 30
Presentation Number: 854
Mentor(s): Bridget Behe

Understanding how customers shop and their process to purchase is essential to helping retailers sell products. Retailers try to understand how their customers select and process information and stimuli (including signs, tags, and other information) used in merchandising. Our study used Tobii Eye-tracking glasses that allowed us to view what customers saw before they made a purchase decision. Using ET technology, we observed how long they looked at a sign or how

many times they picked up a product. We mapped their path to purchase in different types of plant displays. This allowed us to qualitatively and quantitatively distinguish key factors that influenced their choice. After obtaining IRB approval, we collected data from 88 people at a local Meijer Garden Center. Each person was paid $25 for their participation with an additional $10 plant purchase stipend. We fitted them with a pair of Tobii eye-tracking glasses and set them on a shopping trip through the garden center to buy plant material worth $10 or more. We tracked their eye movements and behaviors, analyzing patterns through quantitative and qualitative means. I assisted Dr. Behe and Dr. Huddleston in the analysis of a pilot study in 2017 (with 12 shoppers). We analyzed the videos and conducted a content analysis, and will report both what the participants viewed and how long they viewed certain things in the store.

THE INTERSECTION OF RACE AND ATTRACTIVENESS
Valerie Kemp
Psychology, Oral Presentation
Section: 8, 12:00 PM, Room 30
Presentation Number: 855
Mentor(s): Joseph Cesario

It is common knowledge that race bias exists, and it has been shown that highly attractive people tend to experience better treatment than those lower in attractiveness. But what happens when those two intersect? Does a high-attractive person from a perceived racial group that generally experiences racism get the same positive treatment as a high-attractive White person? Do low-attractive White people experience less negative treatment than other racial minorities? This study aimed to find out. Using the affect misattribution procedure (AMP), participants were shown a series of Black, White, and Asian faces from the Chicago Face Database that had been independently rated as being high or low in attractiveness. Each face was immediately followed by a Chinese character and participants were then asked to rate the Chinese character as either pleasant or unpleasant. The AMP has been found to show that when rating the Chinese character, participants are in fact showing their implicit attitudes toward the preceding faces. The hypothesis was that faces rated high in attractiveness, regardless of race, would score higher in pleasantness than faces rated low in attractiveness. Results supported this hypothesis, showing no main effect of race and a main effect of attractiveness, meaning that participants rated faces of any race that were high in attractiveness as pleasant significantly more than faces rated low in attractiveness.

SOCIAL SCIENCES: GENERAL

ONLINE TRAINING FOR PARAEDUCATORS TO IMPROVE COMMUNICATION SUPPORTS FOR YOUNG CHILDREN WITH COMPLEX COMMUNICATION NEEDS
Kate Cavataio, Jacquelyn Kielb, Kaitlyn Millard
Social Sciences: General, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 166
Mentor(s): Sarah Douglas, Rebecca Kammes

For children with complex communication needs (CCN), communication development does not come easily and they often have less opportunities for communication. In educational settings, paraeducators are the most frequent communication partners for children with CCN, with three times as many interactions than any other group including teachers, speech language pathologists, and peers. Yet, despite federal law that requires paraeducator training and supervision, lack of training for paraeducators remains a persistent problem. This is especially true for training paraeducators as communication partners. This presentation will provide insight into the training, data collection, and data analysis of a single-case research study aimed at providing online communication partner training to paraeducators. This training teaches paraeducators the POWR strategy: Prepare an activity, Offer an opportunity, Wait for a response, Respond to the child. Information related to the creation of the online training and the initial phases of data collection will be presented. We will also discuss the process of conducting observational coding to measure the paraeducator implementation of trained strategies, as well as child communicative outcomes. Results from these first stages of the project will be presented, as well as information on how these impact changes to the training and directions moving forward.

ASSOCIATIONS BETWEEN PARENTAL MIND-MINDEDNESS AND TODDLER EMOTIONALITY AND EMOTION REGULATION
Michal Babinski, Courtney Accorsi, Stephen Krafchak, Colleen Riling, Ericka Williams, Lindsey Gordon, Samuel Isken
Social Sciences: General, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 167
Mentor(s): Holly Brophy-Herb

Parental mind-mindedness refers to the capacity to view the child as having his/her own unique preferences, thoughts, feelings, and intentions. Parental mind-minded comments play an important role in a child's development, such that attuned comments, which reflect an accurate interpretation of the child interests, needs, and emotions, are associated with children's social-emotional competencies. While mind-minded comments occur infrequently, research shows that they uniquely relate to children's outcomes. Due to stereotypes of emotional expectations between genders that may influence development in children, it is essential to examine parental mind-mindedness and its relationship to children's emotionality and emotion regulation in early toddlerhood. This study examines the associations between parental mind-mindedness and child gender, emotionality, and emotion regulation. Low-income parent-toddler dyads (n = 54; 82% white; 27 boys; M_{age} = 25.38 mos, *SD* = 1.61) were observed during a 10-minute free play task. Of the total comments made by the parents, 6% were considered mind-minded, referring most often to children's preferences (81.86% of comments), cognitions (13.29%), and emotions (3.21%). Results show a positive association, for boys only, between greater emotionality, greater emotion regulation, and higher percent of comments that were mind-minded (r = .36, α = .06 and r = .38, α = .05, respectively; $p \leq .10$ was considered given the small sample size). All together, results reflect societal values as they relate to social influences and common perceptions of gender roles.

HOW DO PARENTS' STRESS AND SELF-EFFICACY AFFECT THE WAYS THEY SEE THEIR CHILDREN?
Ella Patrona, Jessica Altenberger
Social Sciences: General, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 168
Mentor(s): Claire Vallotton

Parenting stress and parental self-efficacy are significant factors in how parents interact with their children and how they report their children's behavior to others (Vallotton et al., 2016). Higher parenting stress has been shown to increase parents' hostility and decrease parental sensitivity toward children (McMahon & Meins, 2011). Parenting stress and these associated behaviors are linked to parents' understanding of the various meanings behind children's behaviors (McMahon & Meins, 2011). Further, parenting stress is often derived from parents' thoughts and beliefs about their child's intentions, and perceptions of their own abilities to manage their child's behavior (a.k.a. self-efficacy; McMahon & Meins, 2011). Teti and Gelfand (1991) found that mothers with higher self-efficacy were more likely to recognize the context and developmental function of their child's difficult behaviors and adjust their parenting to support the child. This is particularly important for families with more general stress due to poverty, which can exacerbate parenting-related stress and negatively affect parent-child interactions (Ayoub, Vallotton, & Mastergeorge, 2011). Thus, we hypothesize that parents with lower levels of self-efficacy and higher levels of parenting-related stress will view their toddlers as less socially skilled and more emotionally challenging. Data come from 22 low-income parents of infants and toddlers enrolled in Early Head Start. Parents completed questionnaires about their family, their child, and their parenting, including the Parenting Stress Index Short Form (PSI-SF) and the Brief Infant Toddler Social Emotional Assessment (BITSEA). We will examine correlations between subscales of these measures.

REGULATING HOUSING MARKETS THROUGH THE USE OF PRE-SALE ORDINANCES
Najma Muhammad
Social Sciences: General, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 169
Mentor(s): Noah Durst

Pre-sale inspection ordinances are rules enforced by cities and counties that require buyers/sellers to bring the home into compliance with housing and building codes before transferring or inhabiting the property. These ordinances aim to address issues of blight and code-non-compliant housing in distressed housing markets. There is limited academic research examining the efficacy of pre-sale ordinances, although preliminary evidence suggests that they may actually have the unintended consequence of exacerbating disinvestment in the home and preventing owners from selling their property. This research project aims to understand where and why these ordinances have been adopted and whether

they have achieved their intended purpose. In this presentation, I will provide an overview of my findings up to this point and offer my future research goals.

POST DISCHARGE COPING DIFFERENCES BETWEEN MALES AD FEMALES WITH TYPE 2 DIABETES
Ally Adams
Social Sciences: General, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Ballroom
Presentation Number: 170
Mentor(s): Denise Hershey

Many older adults with type 2 diabetes are admitted to the hospital for other health reasons and may encounter difficulty transitioning from the hospital setting back home. The aim of this study is to identify possible differences in post-discharge coping between males and females in order to decrease risk for readmission for older adults with Type 2 diabetes. This study is a sub-analysis of a larger longitudinal study exploring transitional care issues for older adults with type 2 diabetes. Four variables were examined including sex, number of co-morbidities, number of post-discharge medications, and the Post-Discharge Coping Scale (PDCS). This is a 10-item likert scale that ranges from no difficulty to a great deal of difficulty. The sample consisted of adults 60 years and older admitted to the hospital for more than 36 hours and less than 2 weeks for non-surgical reasons with a pre-diagnosis of type 2 diabetes and discharged home. Those with a primary admitting diagnosis of uncontrolled diabetes that were discharged to an extended care facility, had a Mini-cog score of 2 or lower, or had a history of schizophrenia, a schizoaffective disorder, or dementia were excluded from this study. Descriptives, correlations, and ANOVA statistics were used to analyze the relationship between post-discharge coping, sex, number of co-morbidities and number of post-discharge medications. No statistically significant relationships were found, which could have been due to small sample size and only gathering data from one Midwest Hospital. Findings from this study may assist in the development of interventions to improve transitions from the hospital setting to the home for older adults diagnosed with type 2 diabetes.

FOOD INSECURITY ON CAMPUS: A FRAMEWORK FOR COMPARING MEASURES OF FOOD SECURITY FOR STUDENTS AT A BIG TEN UNIVERSITY
Sidney Linck
Social Sciences: General, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 512
Mentor(s): Jennifer Hodbod

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. For many, the concept of food insecurity brings forth thoughts of developing countries, but it is also an issue in the U.S. and Michigan, with approximately 15% of the general population food insecure. However, uncertainty exists about the food (in)security of student populations - previous research has shown that this is an issue on other college campuses, and although a study has not been done at MSU, we have anecdotal evidence to support it being an issue here in East Lansing. College students have been long profiled for their ramen-based diets, but consistent and prolonged periods of food insecurity, due to either insufficient financial access to food or access to nutritional foods, have adverse effects on physical health, mental health and academic performance. I will present a framework for assessing food (in)security and the relationship between students and their food on Michigan State's campus. The first goal of this project is to discover if a food insecure population exists on campus, and if so, the characteristics of that group. I will outline our mixed methods approach, including a survey of a random sample of students with questions regarding their relationship with food and focus groups that will allow a facilitated discussion around possible interventions to improve food security.

RELIABILITY RATINGS IN RESEARCH
Hanna Rinkevicz, Ashish Tripathi, Jordan Bowdish
Social Sciences: General, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 513
Mentor(s): Kendal Holtrop

Although evidence-based parenting interventions can successfully help children and families, little is known about which parts of these interventions are the most helpful. This NIH-funded grant project is focused on determining the active ingredients of the GenerationPMTO parenting intervention. As part of this research team, we have been utilizing a rating system to determine what makes the PMTO parenting intervention so successful. The rating process works by

identifying an item within a component (a code), judging the extensiveness of that code on a level of 1-3, and compiling the codes together within each component on a scale of 0-6. These ratings help measure what the instructors of each group session are saying, doing, and teaching that develop parenting skills in session participants. Through an intensive training process, our team has learned to apply the rating system to video sessions covering various PMTO topics. We hypothesize that our progress in reliably using the rating system has been nonlinear throughout the training process. We will test this hypothesis by examining the reliability pattern of our research team, exploring variation relative to when we were first learning the coding system. We will then compare the variability in reliability scores across different intervention topics to see if some components are more difficult to rate than others. Understanding more about our training process and how we have learned to reliably rate variables in order to determine the effectiveness of the different components of PMTO is an important step in research on parenting interventions.

PEOPLE VS. THINGS: PERSPECTIVE ON THE UNDERREPRESENTATION OF WOMEN IN STEM
Harli Wood
Social Sciences: General, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 514
Mentor(s): Joseph Cesario

In this paper, I investigate the main cause of gender disparity in STEM. I explore the most common explanations for the underrepresentation of women in STEM careers and argue that the primary cause is lack of interest in STEM fields among women. This stems from differences between men and women in people vs. things orientation, with men being generally more concerned with things, and women with people. The general perception of STEM careers as not allowing for affordance of communal goals leads women to shy away from these fields because generally, women place a high value on communal goals. In order to measure the effect of the perception of STEM as more or less communal on interest in STEM careers I conducted an experiment where communal goal orientation of participants was measured, then perceived orientation of STEM was manipulated, and finally, interest in STEM careers was measured. Using three different passages about STEM, participants were randomly assigned to the things, people, or control condition and asked questions about their interest in pursuing a STEM career. In these data, I am looking for a significant difference in interest in STEM careers which I expect to have a larger effect for female participants. Collapsing across genders, I hypothesize that higher communal goal orientation will be correlated with more interest in STEM for the people condition and less interest among participants in the things condition.

WOMEN IN STEM AT MSU: STATUS OF FEMALE FACULTY IN BIOCHEMISTRY AND MOLECULAR BIOLOGY
Philip Calhoun
Social Sciences: General, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 515
Mentor(s): Danita Brandt

Women are generally underrepresented in STEM (Science, Technology, Engineering, and Math) fields. In this study I examined the status of female tenure-stream faculty in the Department of Biochemistry and Molecular Biology (BMB) to see whether this general pattern applies to this MSU department.Currently, men outnumber women at each of the three tenure-stream academic faculty ranks: Assistant Professor, 45% vs 55%, Associate Professor, 20% vs 80%, Full Professor, 22% vs 78%. However, these percentages represent an improvement over the composition of the BMB faculty ten years ago when women constituted just 18% of the entire tenure-stream faculty of the department.

CORRELATES OF PREJUDICE TOWARDS TRANSGENDER AND GENDER DIVERSE INDIVIDUALS
Terra Dunn, Nina Brown
Social Sciences: General, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 516
Mentor(s): Jae Puckett

It is critical to identify factors that influence attitudes towards transgender and gender diverse (TGD) people given the extreme rates of rejection and violence faced by this marginalized group. Identifying subgroups who hold more negative attitudes towards TGD people or correlates of this prejudice may help identify groups most in need of educational or support programs, ultimately creating more inclusive social contexts for TGD individuals to live within. The sample included 360 participants (225 cisgender women and 135 cisgender men) ranging in age from 18-75 years old (mean = 31) who were recruited via online advertisements and MTurk. We compared demographic groups (gender, race, income,

education, region, geographic location) on the following variables: attitudes towards TGD individuals, critical consciousness, social dominance orientation, education about TGD people, and personal contact with TGD people. There were no differences on any study variables when comparing groups according to race, income, and region. Differences existed across genders with women having higher levels of critical consciousness, lower levels of prejudice towards TGD people, lower levels of social dominance orientation, and more education about TGD people than men. There also were differences across groups according to educational attainment: participants with at least a master's degree had lower levels of prejudice, higher levels of critical consciousness, and more education about TGD people compared to participants with lower education. Lastly, participants who currently lived in urban locations had lower levels of prejudice and more education about TGD people than participants living in suburban or rural areas.

INVISIBLE DOLLARS: CALCULATING THE TRUE VALUE ADDED FROM INTERMEDIATE GOODS IN REGIONAL ECONOMIES
Megan Barry, Nathan Grain
Social Sciences: General, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 517
Mentor(s): Michael Adetayo Olabisi

This research project evaluates the effect of intermediate goods on a region's economy. When gains of trade are calculated for a region, they are calculated by including the foreign value added through the imports of intermediate goods. The U.S. has entered into trade agreements that allows for easy trade of intermediate goods. Specifically, NAFTA has allowed the United States, Canada, and Mexico to integrate their economies and factors of production. After NAFTA, it is common place for U.S. companies to outsource production of smaller components to Mexico, those small components are then shipped into the U.S. for final production. Since the intermediate goods are calculated into the United States' gains of trade, the real gains from trade for the U.S. is lower than the usual calculations. Because of NAFTA, certain cities have had a shift in manufacturing. These cities now import parts that they then combine into a final good. This final production adds value to the product, but the imported parts also had value added in their country of origin. Our analysis suggests that estimates for gains from trade need to be refined to reflect the greater role of intermediate goods trade.

COMMUNITY PARTICIPATORY RESEARCH IN PALMICHAL, COSTA RICA
Emily Hatch, Kate Lafrenz
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 519
Mentor(s): Vincent Delgado

During the spring of 2018, three researchers lived and worked in the community of Palmichal de Acosta for two months as part of a study abroad program for civic engagement and sustainability through Michigan State University. Many conversations with community members, as well as an examination of past research in Palmichal, uncovered a need to further learn about, and address issues facing teens in the community. This interest and concern led to the following research question: *What are the social challenges that youth in Palmichal face today? What are the causes and effects of these challenges?* Researchers utilized three surveys, informal and formal interviews, and an Appreciative Inquiry art installment as the methods to answer this question. Additionally, researchers consulted the Community Participatory Research Cycle (Stoecker, 2013), the RCAH Engagement Model (Delgado, 2010), and the Inquiry Model (Reimer et al, 2004) to design their methodology and analyze results. Research in Palmichal concluded that underage drinking, drug use, and teen pregnancy are the most apparent challenges that teenage youth in the community face. Causes of these challenges include peer pressure, a desire to fit in, easy access to substances, opportunities to use them, lack of information about sex, and lack of communication between parents and children. Effects of these challenges consist of academic struggles, loss of friendships, missed opportunities, and financial and health issues. Reccomendations for future students in Palmichal include working with the community to identify a strategic plan that would address the main challenges facing youth.

RESTORATION FOR RADICALIZATION: INCORPORATING RESTORATIVE PRACTICES FOR EXTREMIST OFFENDER REENTRY
Natalie Hix
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 520
Mentor(s): Derrick Franke

Heavy recruitment efforts from ISIS in its budding years created an increased number of offenders arrested for extremism and terrorism in America from 2008- 2014. From those arrested, seventy-two will be released by the end of 2025. Given the lack of programming in place to assist their reentry into society, the communities in which the offenders will be released face a risk of attack should recidivism occur. Societies are increasingly working to address general criminal reentry, however little attention has been paid to the reintegration of extremists. Nations across the world have begun to experiment with deradicalization as a mechanism for extremist reentry. Deradicalization, or the process of cognitive change from a radical identity to a moderate psychological state, follows a similar pattern to that of criminal desistance. Restorative justice is a criminal desistance approach that involves stakeholders to identify and address harms, needs, and obligations in order to heal and put right effects from the crime. The similarity in criminal and extremist exit processes implies that these restorative processes could be utilized to improve deradicalization programs. In this presentation, I research innovative strategies in France, Indonesia, and the Netherlands, connect elements of these strategies to criminological theories of desistance, and describe how a more restorative framework could strengthen our global approach to deradicalization.

MORAL DISTRESS AND NURSES: A PRELIMINARY ANALYSIS OF QUALITATIVE DATA OF CARING FOR PATIENTS WITH FINANCIAL DIFFICULTY
Johnny Choi
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 521
Mentor(s): Linda Keilman, Douglas Olsen

Healthcare in the United States is costly, creating financial burden for some patients that may lead them to forego needed health care treatment. Nursing practice is guided by the American Nurses Association Code of Ethics which states that healthcare is given based on need without being prejudiced by a patient's individual characteristics, including financial status. Therefore, nurses caring for patients that forgo treatment due to financial difficulties may experience moral distress, defined as distress arising from institutional constraints that prevent one from doing what is right. Moral distress has been linked to negative consequences for sufferers including burnout, job turnover, depression, emotional problems, poor sleep, and substance abuse. The purposes of this qualitative study is to: 1) determine if nurses do experience moral distress when their patients forgo treatment due to inability to pay, and 2) identify and describe patterns and themes in the nurse's experience. This study will conduct in-depth semi-structured interviews with nurses using an interview guide and a quantitative screening tool called the Moral Distress Thermometer. The interview guide was developed from literature on moral distress and patients' finances in relation to health care costs and nursing ethics. Data collection for this study is currently underway and is expected to be completed and analyzed by March 2019. We expect to interview 10-20 nurses. Data will be analyzed for themes reflecting moral distress and its sequelae. Results will be used to guide theory, future research, advocacy, and policy development.

TRENDS IN IMMIGRATION AND CRIME IN MICHIGAN
Isaac Slajus
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 522
Mentor(s): Christina DeJong

There have been numerous studies on the relationship between immigration and crime. All studies I have examined have found that increased immigration is related to decreases in crime, with some finding no correlation. My project will examine immigration and crime rates in Michigan from 1996 to 2016 to determine if any correlation exists. Very few studies (if any) have examined immigration and crime within the State of Michigan. Since about 7% of Michigan residents are immigrants (roughly 1 in 12), and deportation and arrest rates have increased since the beginning of the Trump administration, it would be a fascinating and worthwhile study to see if the changing immigrant population of Michigan has any effect on crime. The data I will use will be annual immigration reports on population as well as short-term-stay

reports. I will separate this data into multiple categories such as lawful residents and naturalized residents (those born within the US). For short-term-stays, I will take in account for vacations, family visits, and several more variables as well.

AN EPIDEMIC OF DESPAIR: MANUFACTURING DECLINE AND OPIOID ADDICTION IN THE US.
Jack Mueller
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 523
Mentor(s): Michael Adetayo Olabisi

Communuities in the United States have been devastated by the opioid crisis. To understand the crisis, this research project explores the relationship between opioid addiction and the decline of manufacturing within the United States at the state level.There is a statistically significant relationship between opioid use with manufacturing job loss by state over the past two decades. Thus, potential policy solutions to the opioid crisis must consider manufacturing trade shocks in the United States.

DECONSTRUCTION INSURANCE POLICY: AN INNOVATIVE PROPOSAL TO END PROPERTY ABANDONMENT
Alex Bahorski
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 524
Mentor(s): Rex Lamore

Residential structures as well as industrial and commercial complexes have lifespans; without constant upkeep they eventually become decrepit and abandoned. When this occurs, local governments commonly become responsible for these properties and must commit the funds to pay for their removal. In cities across the Midwest, residential abandonment has characterized many communities and has proven to be extremely costly. For already struggling cities, entire blocks of blighted housing only worsens their challenges. The practice of demolishing housing sends millions of tons of building waste to landfills. Our policy proposal seeks to break this cycle of structural abandonment through a mandatory insurance policy which will hold property owners responsible for structures from their construction all the way to their final deconstruction. The goal of this policy is to limit the liability of taxpayers and municipalities from having to bear the costs of removing private property while also seeking to divert tons of usable structural material from landfills.

HEALTH IS WEALTH AND WEALTH GIVES HEALTH: COUNTY-LEVEL EVIDENCE
Erik Nygaard
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 525
Mentor(s): Michael Adetayo Olabisi

Strong local economies need healthy people as reliable and productive workers. However, causality goes in the other direction too, as the economy not only benefits from a healthy workforce, but a strong economy affects the physical and mental health of communities. This project analyzed the impact of the economy on community health, by studying the effect of healthcare access and education on life expectancy, the effect of median household income on the rate of residents without insurance -- which is closely related to life expectancy, and the impacts of unemployment on mental health. To carry out this analysis in a statistically robust manner, we compare two geographically similar counties, Milwaukee County, WI and Ozaukee County, WI. The findings show that healthcare access impacted life expectancy, but income and education played a more significant role. The economy has strong effects on mental health, particularly through unemployment.

IN THEIR OWN WORDS: DIGITAL ENCOUNTERS WITH HOLOCAUST SURVIVORS AT THE USC SHOAH VISUAL HISTORY ARCHIVE (SESSION FOUR)
Sean Williams, Claire Mcpherson, Carleigh Lewaniak
Social Sciences: General, Oral Presentation
Section: 4, 8:30 AM, Lake Ontario Room
Presentation Number: 861
Mentor(s): Steven Weiland

In characterizing the Nazi's treatment of Jews and other victims Holocaust historian Doris Bergen says: "The process of crushing people's sense of worth often began with destroying their dignity and honor as men and women." What identity came to mean for a survivor, including what it supplies to powers of empathy or compassion for others, could reflect many forms of wartime and post war experience. Thus, falling into the hands of the notorious Nazi doctors meant being reduced to subjects of abusive experiments. A different struggle can be seen in how survivors rebuilt their identities as part of relocating after the war, many in the United States.

IN THEIR OWN WORDS: DIGITAL ENCOUNTERS WITH HOLOCAUST SURVIVORS AT THE USC SHOAH VISUAL HISTORY ARCHIVE (SESSION ONE)
Alec Bailey, Danielle Duggan, Courtney Drury, Damaris Chavez
Social Sciences: General, Oral Presentation
Section: 4, 8:45 AM, Lake Ontario Room
Presentation Number: 862
Mentor(s): Steven Weiland

While they were victims of the Nazis, Jews interacted with other Jews in particularly trying ways. The Sonderkommando, or "special unit," was a group of Jewish camp inmates forced into some of the most gruesome tasks at the Nazi "killing centers." Holocaust historian Doris Bergen prefers that phrase to "extermination camps" or "death camps," the former because it "suggests the killing of some kind of vermin, not human beings," the second because it "creates the impression of primarily a camp with deadly conditions rather than a site dedicated to killing." Memories of the Sondercommando record the extraordinarily painful relations among Jews, also recognizable in memories of the Jewish Councils in the notorious ghettos, long and unbearable journeys by freight cars to the "killing centers," and the inevitable role of the "bystander" as camp inmates were tortured and murdered.

IN THEIR OWN WORDS: DIGITAL ENCOUNTERS WITH HOLOCAUST SURVIVORS AT THE USC SHOAH VISUAL HISTORY ARCHIVE (SESSION THREE)
Kejsi Dervishi, Sophia Kesler, Estefany Beltran-Flores, Mikayla Lowell
Social Sciences: General, Oral Presentation
Section: 4, 9:00 AM, Lake Ontario Room
Presentation Number: 863
Mentor(s): Steven Weiland

What happened to Holocaust survivors, and how they remembered it, can also be understood in the ways that the experience was shaped by being a child, a woman, or a member of a family in the territories overwhelmed by the Nazi's or in a concentration camp. The Nazis were indiscriminate in their violence. But gender and age mattered in how the Nazis classified their victims according to what could be gained from their labor, and then how they capitalized on their particular vulnerabilities. But gender and age influenced what opportunities there were for relationships and alliances within the camps. Remembering the Holocaust according to gender and age reveals how different are the experiences of survivors.

IN THEIR OWN WORDS: DIGITAL ENCOUNTERS WITH HOLOCAUST SURVIVORS AT THE USC SHOAH VISUAL HISTORY ARCHIVE (SESSION TWO)
Greg Stevens, Abby Weaver, Mikayla Calverley, Tionna Williams
Social Sciences: General, Oral Presentation
Section: 4, 9:15 AM, Lake Ontario Room
Presentation Number: 864
Mentor(s): Steven Weiland

Holocaust historian Doris Bergen reminds us that victims did what they could to maintain themselves in the worst of circumstances: "Starved, isolated, and destitute, Jews were in a weak position to offer resistance to the Germans. Nevertheless, like others they did resist—violently, passively, spiritually, physically, and emotionally—throughout the

entire process of the 'Final Solution'." This session features different forms of religious belief in the war time experience of victims and survivors. As Bergen says, close observation of Jewish victims shows that contrary to Nazi propaganda "there was no such thing as 'the Jew,' only Jews who often differed as much, and in many cases more, from one another than they did from the Christians around them." And victims differed too in how, in the circumstances of their suffering, they viewed Christians and Christianity.

THE IMPACT OF URBAN AGRICULTURE ON WELLBEING AND RESILIENCE
Samantha Wagner
Social Sciences: General, Oral Presentation
Section: 4, 9:30 AM, Lake Ontario Room
Presentation Number: 865
Mentor(s): Jennifer Hodbod

There are many forms of urban agriculture (UA), including community gardens, allotments, and private farms. Numerous studies (Alaimo 2008; Kingsley et al. 2009; Okvat and Zautra 2011) highlighting benefits of UA (commonly as community gardens), including access to green space, improved human health, greater social interactions, and better connections to fresh food. However, there are few studies that a) address multiple types of UA, and b) combine quantitative data regarding all of these potential benefits to assess the impacts on wellbeing and resilience. Wellbeing (the state of being comfortable, healthy, or happy) and resilience (the ability to cope with change) are interlinked. Given they are both dependent upon internal and external factors, we identified which capacities of individuals and which features of UA programs relate to increased wellbeing and resilience. We quantify these impacts for the first time in three cities that demonstrate different types of urban agriculture: Phoenix, Arizona; Exeter, UK; and Aarhus, Denmark. We analyzed the dataset that included survey data from individuals that participate in UA programs across the three cities (n=329). Our analysis shows that UA contributes to wellbeing through relationships with multiple sources of capital - social networks i.e. social capital; diverse sources of nutritious food and access to green space i.e. natural capital; educational opportunities i.e. human capital. These forms of capital build resilience by strengthening principles of resilience such as diversity, connectivity, and learning. This framing will allow us to compare outcomes across cities and types of UA.

APPLYING THE FLASHPOINT MODEL OF PUBLIC DISORDER TO THE FREDDIE GRAY UPRISING
Najma Muhammad
Social Sciences: General, Oral Presentation
Section: 4, 9:45 AM, Lake Ontario Room
Presentation Number: 866
Mentor(s): Jennifer Cobbina

Why did massive uprising take place following Freddie Gray's death? What makes Freddie Gray's death significant to the events that followed? In this presentation, I will apply the Flashpoint Model of Public Disorder to the events that unfolded in the city of Baltimore, Maryland, before and after the killing of Freddie Gray. This model considers several factors that have been understood to have an underlying role in the commencing of unrest, as it considers broad societal features and specific patterns of interaction to explain how unrest occurs. Each factor attempts to observe the realities of both protesters and the police to understand how and why public disorder unfolds. The conclusion and implications will be discussed.

THE RADICALIZATION PROCESS: STORIES FROM THE FIELD
Billy Wetzel
Social Sciences: General, Oral Presentation
Section: 5, 11:00 AM, Lake Ontario Room
Presentation Number: 871
Mentor(s): Sheila Maxwell

Many scholars have examined radicalization and have put forth theories for why people join various insurgent and terrorist groups. This project uses field interviews of members of three different terrorist organizations with operations in the Philippines? the Abu Sayyaf Group (ASG), Jemaah Islamiyah (JI), and New People's Army (NPA) to assess and compare motivations for joining the groups. These three groups are all considered active terrorist organizations and have similarities and differences. Both ASG and JI are considered to be Islamic extremist groups, while the NPA is a communist organization. All members of the ASG and the NPA that were interviewed were citizens of the Philippines, while the members of JI were from other countries and came to the Philippines to establish an Islamic State. The interviews were of current and former members of each group and were conducted by Dr. Sheila Maxwell in the

Philippines between 2013 and 2015. The goal of this current project is to examine the role that early childhood and adolescent experiences play in the radicalization of individuals.

EXPLORING AUTONOMOUS VEHICLES FOR THE TRANSPORTATION DISADVANTAGED
Carrianne Cusack
Social Sciences: General, Oral Presentation
Section: 5, 11:15 AM, Lake Ontario Room
Presentation Number: 872
Mentor(s): Tongbin Qu

The next revolution in the transportation world, Autonomous Vehicles (AV), will have a great impact on all aspects of our society, especially on mobility. AV brings the opportunity to increase mobility for those who do not own a car or are unable or unwilling to drive, such as people with disability and senior citizens (or sometimes called vulnerable road users). The benefits for these groups would include independence, reduction in social isolation, and access to essential services. Some of mobility needs for the vulnerable road users are currently provided by public transit or paratransit agencies, but each of these services has significant disadvantages. Public transit generally requires fixed routes that may not serve people where they live and work. Paratransit services are expensive because they require a trained, salaried, human driver. Since these costs are generally borne by taxpayers, substituting less expensive AV for paratransit services has the potential to improve social welfare. However, simply providing AV loaded technologies would not solve the mobility needs for vulnerable users, there are other barriers including psychological and communicational besides the physical and technological ones. Nevertheless, outside of the vehicle manufacture and academic research arena, currently cities and communities do not have much knowledge of AV, not to mention any plan to take advantages of the benefits. The study will assess the readiness of the upcoming AV for community mobility needs in the following areas: 1) identification of vulnerable user size for using AV, 2) current mobility mode of these vulnerable users, 3) current unfulfilled mobility needs of these vulnerable users, 4) current city/community spending on public transportation and paratransit, 5) current transportation spending of vulnerable users, and 6) vulnerable users' perceived barriers to use AV.

THE HOUSING AND NEIGHBORHOOD QUALITY OF LOW-INCOME HOMEOWNERS: DO PERCEPTIONS MATCH REALITY?
Sadie Shattuck
Social Sciences: General, Oral Presentation
Section: 5, 11:30 AM, Lake Ontario Room
Presentation Number: 873
Mentor(s): Anna Santiago

Increasing the housing and economic opportunities available to low-income and minority communities have been focal areas of housing policy in the United States since the late 1980s. Since the collapse of the U.S. housing market in 2008, however, scholars and policymakers have expressed renewed concerns about the value of homeownership, particularly for low-income and minority homeowners and the neighborhoods within which they reside. Studies since 2010 suggest the precariousness of homeownership and well-being tied to owning a home for low-income and minority owners. This study uses retrospective survey data, systematic social observations and longitudinal data from U.S. census and administrative sources to examine housing and neighborhood quality of life over time for 550 low-income, minority homeowners from Denver, Colorado. Specifically, the study will address the following research questions: (1) What is the quality of housing occupied by low-income homeowners?; (2) What is the neighborhood quality of life experienced by low-income homeowners and their children?; (3) Has the quality of housing and neighborhood changed over time?; and (4) Do homeowner subjective perceptions of housing and neighborhood quality match those of objective measures? Preliminary findings suggest that in general both housing and neighborhood quality increased with homeownership. This was particularly so for homeowners who participated in homeownership counseling programs offered in Denver. In addition, homeowner perceptions of housing and neighborhood quality were generally consistent with those derived from objective measures. However, homeowners who did not participate in pre-purchase homeownership counseling were more likely to report concerns with their housing units and neighborhoods.

LIGHTS, CAMERA, ACTION: MEXICAN-AMERICAN IDENTITY FORMATION THROUGH REPRESENTATIONS IN POP CULTURE
Michael Sandoval
Social Sciences: General, Oral Presentation
Section: 5, 11:45 AM, Lake Ontario Room
Presentation Number: 874
Mentor(s): Delia Fernandez

Throughout the last thirty years of historical research, there has been more interest and scholarship produced in the study of Mexican-Americans in the United States of America. An important and valuable part of this research is that of cultural and identity formation that has allowed ethnic Mexicans, Mexican Nationals, and Mexican-Americans to live and thrive in America. Cultural Coalescence, a term coined by Vicki Ruiz in From Out of the Shadows: Mexican Women in Twentieth-Century America, has allowed for the multi-generational descendants of first-generation Mexican immigrants and those integrated into society following the Treaty of Guadalupe-Hidalgo to "pick, borrow, retain and create distinctive cultural forms," creating a culture that is neither Mexican or American; but, a unique amalgamation of the two. However, there have been few studies on how pop culture has reflected this process and shaped it in the past three decades. This work reveals how Mexican American-themed films and historical research intersect allow for a deeper understanding of the foundational roles in which labor practices, gender, race, and pan-ethnicism have played in this formation of culture and identity. Utilizing these foundational aspects of Chicano research, this project will broaden the temporal scope to include a conversation that combines both gender and critical race theory with cultural representations of Mexicans in American pop culture (i.e. film, music, and other entertainment industries).

MICHIGAN'S INCOME, HOUSING, AND JOB DISPARITY IN METRO AREAS
Dominic Pavone
Social Sciences: General, Oral Presentation
Section: 5, 12:00 PM, Lake Ontario Room
Presentation Number: 875
Mentor(s): Noah Durst

This research project examines imbalances in housing and employment in the Grand Rapids, Ann Arbor, and Traverse City, Michigan, metropolitan areas. We examine who lives in each neighborhood, their income level, and what types of jobs are located in the area in order to identify disparities between where people work and where they live, and whether housing exists to accommodate them. We used data from the American Community Survey (FactFinder), local housing permit data from State of City Data Systems, and GIS data from each area's respective planning departments. Additionally, we also used our own independent research and databases derived from the Longitudinal Employer-Household Dynamics Survey. We find evidence that areas with a high concentration of low-income employment often lack walkable streets and sufficient affordable housing.

UNIVERSAL DESIGN IN TECHNOLOGY-LEARNING ENVIRONMENTS ON CAMPUS: A CASE STUDY USING BEHAVIORAL MAPS AND OBSERVATIONS
Rachel Rantanen
Social Sciences: General, Oral Presentation
Section: 5, 12:15 PM, Lake Ontario Room
Presentation Number: 876
Mentor(s): Suk Kim

This research addresses the problem of how technology is made accessible in computer labs at Michigan State University. To solve this problem, it is necessary to understand how users interact with existing spaces on campus and how users experience technology in these computer labs. This research particularly focuses on elements of design that lack or contribute to the accessibility of on-campus computer labs. Thus, this research addresses how computer labs on campus are accessible to the Michigan State University community. The research conducted is an observation-based research study designed to collect behavior mapping data, field measurements, and interview evidence. In the presentation, we will share the results of the data collection process. We anticipate the results of our research will provide a more in-depth look at how users interact with computer labs on campus and how they supply universal and inclusive design principles. This information will help us understand how the built environment of computer labs on campus impacts access to technology.

DISPLACEMENT OF MENTALLY ILL PATIENTS IN THE UNITED STATES
Emily Jenkins
Social Sciences: General, Oral Presentation
Section: 6, 1:30 PM, Lake Ontario Room
Presentation Number: 881
Mentor(s): Colleen Tremonte

People living with mental illnesses have historically endured ostracization from society because of the common misconception that those who suffer are "crazy" or are a threat to public safety. Until the mid-twentieth century in the United States, people diagnosed with mental illnesses were physically displaced from their homes and emotionally displaced from their previous identities as their autonomy was stripped. As mental illness was often understood to be the result of a moral or spiritual failing by the person afflicted, sufferers were removed from their homes and placed in asylums kept away from normally functioning society. This study will consist of a historical overview of the extent to which people diagnosed with mental illnesses up until the mid-twentieth century were both physically and emotionally displaced from their environment. It will primarily focus on the period from 1940-1970, known as deinstitutionalization, when a movement within the United States demanded the shutdown of all mental health institutions. This study will examine six main reasons for the onset and progress of the deinstitutionalization movement: criticism about the operation of institutions; the increase in medications available to treat mental illness; the enactment of new federal policies; a transition toward community-based care; increased advocacy and positive public opinion; a reduction in the cost of mental hospitals. These six criteria have been adapted from the work of Dr. Duane Stroman in his book, The Disability Rights Movement: From Deinstitutionalization to Self-Determination and have been considered from a new perspective. Finally, this study will research how deinstitutionalization and decisions made during post-deinstitutionalization led to a massive physical displacement of patients, often resulting in mentally ill patients being homeless and without care.

AN EPISTEMICIDE: COGNITIVE INJUSTICE IN REFUGEE EDUCATION
Alexa Stechschulte
Social Sciences: General, Oral Presentation
Section: 6, 1:45 PM, Lake Ontario Room
Presentation Number: 882
Mentor(s): Colleen Tremonte

People living with mental illnesses have historically endured ostracization from society because of the common misconception that those who suffer are "crazy" or are a threat to public safety. Until the mid-twentieth century in the United States, people diagnosed with mental illnesses were physically displaced from their homes and emotionally displaced from their previous identities as their autonomy was stripped. As mental illness was often understood to be the result of a moral or spiritual failing by the person afflicted, sufferers were removed from their homes and placed in asylums kept away from normally functioning society. This study will consist of a historical overview of the extent to which people diagnosed with mental illnesses up until the mid-twentieth century were both physically and emotionally displaced from their environment. It will primarily focus on the period from 1940-1970, known as deinstitutionalization, when a movement within the United States demanded the shutdown of all mental health institutions. This study will examine six main reasons for the onset and progress of the deinstitutionalization movement: criticism about the operation of institutions; the increase in medications available to treat mental illness; the enactment of new federal policies; a transition toward community-based care; increased advocacy and positive public opinion; a reduction in the cost of mental hospitals. These six criteria have been adapted from the work of Dr. Duane Stroman in his book, The Disability Rights Movement: From Deinstitutionalization to Self-Determination and have been considered from a new perspective. Finally, this study will research how deinstitutionalization and decisions made during post-deinstitutionalization led to a massive physical displacement of patients, often resulting in mentally ill patients being homeless and without care.

LONG-TERM HEAD START IMPACT ON OUTCOMES FOR CHILDREN IN FOSTER CARE
Kendra Hungerford
Social Sciences: General, Oral Presentation
Section: 6, 2:00 PM, Lake Ontario Room
Presentation Number: 883
Mentor(s): Kyunghee Choi

Based on Head Start Impact Study data (HSIS), this study examined the effects of Head Start on cognitive, social-emotional, and health outcomes measured on children from ages 3 to 8 in foster care. One specific subpopulation of families that Head Start seeks to reach is those with children in foster care. Families with children in foster care are eligible, regardless of family income. Despite numerous state and federal initiatives on promoting enrollment of foster care children in Head Start, few Head Start eligible children in foster care have attended Head Start. Accordingly, few studies examined the Head Start impact on children in foster care, particularly for long-term outcomes. This study investigated Head Start long-term impacts on children's cognitive, social-emotional, and health outcomes from ages 3 to 9. Children in foster care who participated in Head Start tended to have overall higher cognitive, social-emotional, and health outcomes. Head Start has a positive impact on the cognitive, socio-emotional, and health outcomes for children in foster care. Despite the positive impacts of Head Start, few eligible foster children enrolled in Head Start (less than 5%). Earlier enrollment in quality services, such as Head Start, could lead to a more positive outcome. Based on these findings, our study suggests that Social Workers should not only advocate for their clients but also evaluate, identify and connect adequate social services to clients in need. A future study needs to be done to identify the barriers to access to Head Start.

EFFECTS OF SOCIAL SUPPORT ON THE ASSOCIATION BETWEEN STRESSFUL LIFE EVENTS AND MENTAL HEALTH AMONG COLLEGE STUDENTS
Jessica Mayfield
Social Sciences: General, Oral Presentation
Section: 6, 2:15 PM, Lake Ontario Room
Presentation Number: 884
Mentor(s): Kyunghee Choi

Recently, the prevalence of mental health illnesses of college students has risen. The purpose of this research is to determine whether social support (informal and formal) and self-esteem can moderate the associations between life stress and mental health among social work college students at MSU. Specific research questions considered in the current study are: i) Does life stress affect mental health among college students? ii) Do social support (informal and formal) and self-esteem moderate the associations between life stress and mental health? And iii) What are the characteristics of students associated with life stress, social support and self-esteem? A total of 184 students (n [undergraduate] = 128; n [graduate] = 56) participated in the survey. Survey consisted of questions about stressful life events, formal social support on campus, informal social support, self esteem, depression, anxiety, and baseline characteristics (age, sexual orientation, year of school, family size, income, employment status, activity participation in school, and previous diagnosis on mental health (depression, anxiety, bipolar disorder). Regression analysis was used to examine research questions. Findings indicated that students who experienced more stressful life events reported higher depression and anxiety. Informal social support and self-esteem significantly enhanced positive mental health. However, formal social support (social service use on campus) did not have impacts on students' mental health. Older students and part-time students had more positive mental health. More life stress was found for older students, students living with lower income, non straight/heterosexual student, and those who ever been clinically diagnosed with a mental health illness.

CONCEPTUALIZING PERSPECTIVE IN RURAL AN ANALYSIS OF INDIVIDUAL ASSUMPTIONS AND RESPONSES INFLUENCED BY TELEVISED PROGRAMMING
Courtney Parker
Social Sciences: General, Oral Presentation
Section: 6, 2:30 PM, Lake Ontario Room
Presentation Number: 885
Mentor(s): Eileen Roraback

Understanding the experience and perspective of rural America is cardinal in propelling the nation toward a more complete integration.This study will analyze Caucasian students' perspective, while examining their perceived perception of African Americans through televised programming. Racial assumptions, as it relates to social, political, and economic divergence, may stand in the way of cultural assimilation. Today, television serves as a reference manual for

cultural competency among many ethnic groups, and rural whites are no different. The question I will be investigating is: Do Caucasian college students have pre-formulated biases about of African Americans due to their perceptions of them on television? The purpose is to provide qualitative data, by way of interview methodology. In doing so, I investigate the motivation and factors that may influence perspective that dispense pre-formulated biases. Uncovering the connection between one's perspective and exposure to media images will be important to our comprehension of aspects of rural Americans' racial attitudes.

STRESS AND OBESITY AMONG LOW-INCOME HEAD START MOTHER-CHILD DYADS
Mallory Lueck
Social Sciences: General, Oral Presentation
Section: 6, 2:45 PM, Lake Ontario Room
Presentation Number: 886
Mentor(s): Jiying Ling

This study aimed to examine the relationship between stress and obesity in low-income mothers and their Head Start children. A cross-sectional, correlational study design was conducted. Before data collection, the University Institutional Review Board and Head Start administrators approved the study. Thirty-five mother-child dyads were recruited from two urban Head Start centers. Hair samples were collected from both mothers and children to assess their hair cortisol concentration (HCC). Height and weight were also measured to calculate body mass index (BMI) and BMI z-score. The sample of participants included 17.1% Hispanic mothers and 54.3% Black mothers; the children in the study were 22.9% Hispanic and 60% Black. Around 14.3% of children were overweight and 20% were obese; while 29% of mothers were overweight and 58.1% were obese. Mothers had a mean HCC of 6.97 pg/mg (*median*=4.05, min-max: 0.40-29.90), and children had a mean HCC of 32.02 pg/mg (*median*=7.70, minmax: 0.50-157.20). Children's HCC was not significantly related to their BMI z-score (*r*=.06, *p*=.751). This is because among children with HCC r=-.41, *p*=.146), but among children with HCC ?median, children's HCC was positively related to their BMI z-score (*r*=.24, *p*=.396). Whereas, mothers' HCC was negatively correlated with their BMI z-score (*?*=-.38, *p*=.047). The study's results suggest that a threshold level for HCC may need to be reached before it has significant influence on children's BMI z-score. More research is needed to investigate the unexpected negative relationship between mothers' HCC and BMI.

SOCIAL WORK

GENTRIFICATION WITHOUT DISPLACEMENT: REBUILDING THE MICHIGAN STATE FAIRGROUNDS USING A NEIGHBORHOOD-BASED DEVELOPMENT MODEL
Mike Zandstra
Social Work, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 589
Mentor(s): Marya Sosulski

Since the 1960's, the city of Detroit has experienced a historically significant drop in population and economic activity. With the decline of the US domestic auto industry, alongside increasing suburbanization and economic polarization, Detroit has become home to many blighted areas, abandoned homes, and vacant lots. However, with increased interest and development of the downtown area, local and national developers have begun to purchase land around the city to build new businesses, housing, and transportation options. This gentrification process has cultural implications on communities who are struggling to maintain their status quo, especially in neighborhoods surrounding the Michigan State Fairgrounds site. The site, the largest remaining contiguous plot of land available for development in Detroit, was recently sold to the city from the Michigan Land Bank. Officials have suggested developing the plot into a mixed-use industrial complex, providing 2,000-3,000 jobs to the area. Neighborhood organizations like the State Fairgrounds Development Coalition have developed their own plan and principles for the Fairgrounds site development, including; providing environmentally conscious utilities, residential housing, and technical showcases of Michigan's innovative projects. This research will examine how community-driven positive growth can occur without displacement of long term residents by using the example of the State Fairgrounds development site. This project focuses on how utilization of a Community-Based Development model, based on development principles shown to be effective in other global models and those identified by community members and activists, may promote healthy growth in the community and reduce negative effects of gentrification.

EXPERIENCES OF COLLEGE STUDENT SERVICE PROVIDERS ON INTIMATE PARTNER VIOLENCE: POLICY AND PRACTICE IMPLICATIONS
Kristen Gennety, Shavonna Green
Social Work, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 590
Mentor(s): Hyunkag Cho

Intimate partner violence (IPV) in a relationship, or dating violence (DV), is a large social problem affecting one third of girls and about one half of college-aged women in the United States. Intimate partner violence has many consequences for a survivor, such as mental health concerns, behavioral and physical health concerns, and higher chances of victimization later in life. Twenty-four interviews with professional college service providers (e.g., physicians, nurses, counselors, sexual assault response team, and police) in the field at MSU were conducted to gain their perspectives on DV among college students and if the service provided met the needs of students. These interviews were then cross analyzed to identify trends in responses and reoccurring themes between professions. This analysis found several recurring themes in the interviewee's responses, including cultural barriers, issues of self-determination, the potential shame of a survivor, and lack of critical understanding of Title IX between professions.

exploring campus sexual assault reforms: a qualitative study
Amanda Washnock, Marisa Ikenn
Social Work, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 591
Mentor(s): Carrie Moylan

Approximately one out of every five female undergraduate students experiences sexual assault during college. In the past decade, campuses have been under increasing pressure to improve their policies, prevention programming, and response to students who disclose an assault. In particular, campuses have been navigating increased and continually shifting federal regulatory attention, which has spurred numerous reforms on campuses. The purpose of this research was to gain a better understanding of how current policy reforms regarding campus sexual assault have been implemented on university campuses across the United States. Phone interviews were conducted with campus staff and administrators involved in their campus efforts to implement sexual assault policies. Twenty-one interviews were conducted between November 2018 and February 2019. Results suggest that while many improvements have been made on campuses, there continue to be inconsistencies between the outward image that campuses project of successful policy implementation and the inner workings of campus procedures and programs. Participants spoke of their concerns that new federal policy shifts will erode some of the improvements that have been made and magnify the implementation gaps. These findings shed light on the need for policy makers to evaluate the success of previous policy directives and consult with those who are most closely involved in the work of implementing policies on campuses, in order to design policies that increase student safety, ensure access to educational opportunities free from violence, and that appropriately respond when students are harmed by sexual violence on campus.

THE EFFECTS OF MEDIA PORTRAYALS ON THE DEVELOPMENT OF THE MICHIGAN STATE FAIRGROUNDS
Nicole Severn
Social Work, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 592
Mentor(s): Marya Sosulski

The City of Detroit Michigan is one that has suffered under the scrutiny of media portrayals. In the mid to late 2000's, especially during the Great Recession, Detroit was consistently seen in the media in a negative light. At around the same time, in 2009, the Michigan State Fair closed its doors after 170 years; the 160 acres of land there were left vacant in Detroit and were supposed to be redeveloped but ten years later there are still no concrete plans. Through research in partnership with a Detroit advocacy organization, The State Fairgrounds Development Coalition (SFDC), data were collected in an effort to learn what local community members want the future development to look like. The data for this study were drawn from the State Fairgrounds Area Neighborhoods Study (SFANS), including surveys of Detroit residents, interviews from those involved in advocacy efforts around the redevelopment of the fairgrounds, and focus groups made up of a local community members. The major themes in the SFANS, used to help participants identify neighborhood assets and concerns, are then compared with the results of a content analysis of media from a variety of types and sources based on the same themes. The aim of the study is to give Detroiters a voice, discover what type of

media is best to portray the reality of the impact of development, and effectively advocate for the citizens' interest in the future redevelopment of the Michigan State Fairgrounds.

EVALUATION OF A PROTOTYPE FOR INTEGRATING MENTAL HEALTH ACROSS GERONTOLOGICAL ENVIRONMENTS: A VIRTUAL REALITY APPROACH (IMAGE-VR)
Claire Beutler
Social Work, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 593
Mentor(s): Daniel Velez Ortiz

Puerto Ricans comprise the Latino group with the highest likelihood of psychiatric disorders. The older Latino population living in the United States largely are not receiving the mental health services that they need. The study, Evaluation of a Prototype for Integrating Mental Health Across Gerontological Environments: A virtual reality approach (IMAGE-VR) is grounded in the understanding that culture and perceptions of mental healthcare are central to an individual's decision to access services. This study incorporates the perspectives of older Puerto Rican adults about depression and mental health services through analyzing a prototype of a depression literacy curriculum that is culturally relevant. Curriculum was presented in English through the story of an older Puerto Rican individual receiving depression treatment. The story was filmed in a 360° video and formatted for a Virtual Reality platform. The experience and curriculum were evaluated by community-dwelling older Puerto Rican adults. This project intends to assess the prototype of the IMAGE-VR within a Puerto Rican community, in addition to understanding the advantages and limitations of using VR Technology with a population of older adults. In this poster I will be displaying the themes that have emerged from the literature review and explain trends that have been discovered from the qualitative data analysis. Preliminary analysis indicate that participants had a positive reaction to the VR technology and stated that it was a beneficial tool to educate others about depression. The focus group setting encouraged an environment in which individuals shared their own experiences about mental health. They discussed the importance of the material presented with this technology being culturally sensitive for the population it is trying to reach.

MOVEMENT OF A CITY: BARRIERS TO ACCESSIBILITY AND MOBILITY IN DETROIT'S PUBLIC TRANSPORTATION
Joey Ingall
Social Work, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 594
Mentor(s): Marya Sosulski

In order to attain and uphold "world class" status, a city needs to be committed to providing high quality amenities and services, such as public transportation. When considering the movement of people throughout a city, it is critical to recognize and subsequently provide for the needs of all who utilize and/or rely on public transportation. The needs of populations that experience barriers to mobility, such as older adults and people with disabilities, are often not met or considered by planners and decision makers of public transportation systems. This study focuses on public transportation in Detroit, Michigan, particularly with regard to accessibility and mobility using data from the State Fairgrounds Area Neighborhoods Study (SFANS). SFANS concentrates on the voices and opinions of community members in the 13 neighborhoods surrounding the historic State Fairgrounds.The study's model draws on Asset-Based Community Development (ABCD) and Community-Based Participatory Research (CBPR) approaches. Original data were collected through community outreach and engagement during events such as door-to-door canvassing, focus groups that were open to the public, and interviews with key informants. The survey data were analyzed using descriptive statistical methods (i.e. crosstabulations, multinomial logistic regression); and the focus groups and interviews were analyzed using narrative analysis techniques. The SFANS data were then combined with secondary data from the Census Bureau and the American Community Survey (ACS). The results of the study can be used in further outreach, engagement, and advocacy efforts to influence Detroit's progression toward world class recognition, by supporting all community members and visitors.

KNOWLEDGE TO CHILDREN: IMPLEMENTING A NEW SCALE TO TEST THE MENTAL LITERACY OF ADOLESCENTS
Koi Mitchell, Sydney Modica, Iris Wong, Cat Asteriou
Social Work, Poster Presentation
Section: 1, 3:00 - 4:30 PM, Lake Huron Room
Presentation Number: 595
Mentor(s): Joanne Riebschleger, Daniel Cavanaugh

Mental health literacy is a person's knowledge of mental health, help-seeking, coping skills, and attitudes about mental illness. Researchers have demonstrated that increased levels of mental health literacy may positively impact the mental health of young people. Unfortunately, there is a limited amount of research done to measure the mental health literacy of adolescence. This may be related to a lack of valid and reliable scales to measure this construct. The purpose of this study was to use the Knowledge to Children scale to assess levels of mental health literacy in young people in public schools. Knowledge to Children is a newly developed measure of mental health literacy for young people. Administration of this scale was conducted at a public middle school and high school. Students were administered the scale using paper and web-based multiple choice surveys (n=151). This scale administration gives researchers insight into levels of mental health literacy in middle and high school students in public schools. Researchers were also able to compare and contrast students' levels of mental health literacy by demographics (age, grade, gender, etc). Through the use of the Knowledge to Children scale, school mental health professionals may gain increased insight into the mental health knowledge needs of their student bodies.

SOCIOLOGY

THE ROLE OF GENDER IN SURVIVOR AND SOCIETY: IS IT AN ACCURATE REPRESENTATION?
Kyle Stinson
Sociology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 365
Mentor(s): Samantha Fox

Research looks at different typologies of female and male contestants to observe the different typologies of masculinity within the reality show *Survivor.* Understanding the typologies of the contestants ponders the question if the social context and social environment the contestants create in the utopia is an accurate representation of the current society we live in.

EMPLOYER AND EMPLOYEE INSIGHT FOR ACCOMMODATING HIDDEN DISABILITIES
Keenan Case
Sociology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 366
Mentor(s): Stacy Hickox

Employees and applicants with hidden disabilities may require accommodations to effectively preform job duties. Due to the lessened visibility of hidden disabilities, the employee or applicant is faced with the unique and difficult situation of having to reveal her disability. This process is burdensome due to stigma and stereotypes surrounding psychiatric and other hidden disabilities. This research will aim to analyze the accommodation process by collecting data via surveys of employers and employees with hidden disabilities and determine where those hurdles to accommodations are placed and which, if any, proposed solutions would best leap such hurdles.

MSU WAGE GAP IN THE CHEMISTRY DEPARTMENT
Gabby Encinas
Sociology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 367
Mentor(s): Danita Brandt

It is well-documented that women are underrepresented in STEM field in many major educational institutions. There is also documentation of women being paid less than men at the same academic level. In this study I examined the

Department of Chemistry see whether this general pattern exists at MSU. To do this I analyzed the salaries of tenure-stream faculty in the Chemistry Department from 2017-2019. I took the salaries of women at each academic rank (Assistant, Associate, and Full Professor) and computed the average across all faculty ranks in the Department. I did the same for men and compared the numbers. I also compared averages between men and women within the same rank (i.e. all men at the Assistant Professor level vs all women Assistant Professors.) The results show that, comparing male and female faculty at the same rank, women, on average, earn less than men when they are Assistant and Associate Professors. However, currently, the average salary of female Full Professors is higher than the average salary for male Full Professors. This results in a higher the overall average salary (all ranks averaged together) for female faculty.

WOMEN IN STEM AT MSU: IS THERE A CONNECTION BETWEEN SUCCESS AND RANKING ACROSS THE DEPARTMENTS OF FAMILY MEDICINE
Brittany Bush
Sociology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 368
Mentor(s): Danita Brandt

Women in the medical field have a difficult time advancing in their careers. The question that inspired this project is, what creates an environment that supports promotion of women in their careers at universities? The percentage of tenured female faculty in medical schools varies widely between different universities. I hypothesized that the percentage of tenured female faculty would be an indicator of support; the higher the percent tenured female faculty, the more supportive the environment for women. I compared the number of male and female tenured faculty (Associate Professor or above) in Departments of Family Medicine at five different universities. I picked five schools that represented a range of rankings: Stanford (#3), University of California, San Diego (#5), Colorado University (#32), Wayne State University (#78) and Michigan State (#89). As the rank of the program increased, the difference between the percent tenured male and female faculty decreased, regardless of which gender was higher. This suggests that there may be a connection between program rank and supportive environment; a topic for future research.

MSU WOMEN IN STEM: STUDENT ENROLLMENT IN THE COLLEGE OF VETERINARY MEDICINE, 2008-2019
Brianna Thomas
Sociology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 369
Mentor(s): Danita Brandt

Like many STEM fields, the veterinary profession is historically dominated by men. However, in the 21st century, women tend to be well-represented in the veterinary sciences. The purpose of this research to examine the fall enrollment for undergraduate and graduate students in the College of Veterinary Medicine at MSU over a 10-year period (2008-2019) with a focus on trends in gender and ethnicity representation. At MSU, Caucasian women currently make up more than 80% of the enrollment for both undergraduate and graduate students. Minorities comprise no more than 7% of undergraduate and 4% of graduate students; minority students compose a larger percentage of the undergraduate student populations. This represents an increase from a decade ago. Explanations for the feminization of the veterinary sciences include changes to admission and other policies brought on by the passage of Title IX, the subsequent increase in the number of female role models, and, unique to the veterinary sciences, improvements in restraint techniques for large animals.

WOMEN IN STEM AT MICHIGAN STATE UNIVERSITY: THE STATUS OF FEMALE FACULTY IN THE DEPARTMENT OF ATHLETIC TRAINING
Joi Takenouchi
Sociology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 370
Mentor(s): Danita Brandt

Although our society has come a long way in the fight for gender equality, there are still many stigmas and stereotypes that exist in people's minds. Stereotypes can act as barriers for women wanting to advance their career or assume leadership positions, especially in a male-dominated field like athletic training. The purpose of this project is to document the status of women in athletic training programs and as athletic trainers at MSU. Although the representation of women in athletic training programs has increased, with women representing 46.4% of graduate assistant athletic

trainers, and 47% of assistant or associate athletic trainers, the number of women advancing to a position such as head athletic director has not increased significantly, with women holding only 17.5% of the head athletic training positions held by women. At Michigan State University, the majority, 9/17, of the athletic training staff are women, and one of these women, Dr. Sally Nogle, holds the position of head athletic director and is in charge of the football, field hockey, and women's golf teams.

WOMEN IN STEM AT MSU: WOMEN FACULTY IN MECHANICAL ENGINEERING
Faith Holmes
Sociology, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Lake Huron Room
Presentation Number: 371
Mentor(s): Danita Brandt

Gender inequality is an important issue in engineering related fields. The purpose of this research is to document the proportion of women at Michigan State University in one of these fields- Mechanical Engineering. Mechanical Engineering (ME) classes were introduced to the Michigan Agricultural College in 1886. Data from the university archives show that there were no women faculty members present at this time. Instead, women held secretary or clerk positions. The Department's current website shows that there has been progress in creating gender equality; however, the number of female faculty declines with increasing rank. Currently, 4 of 19 (21.1%) Assistant Professors are women, 1 of 10 (10%) of Associate Professors are female, and only 1 of 28 (3.6%) of Full Professors are women. Rebecca Anthony is a notable Assistant Professor who has been awarded the prestigious NSF Career award. This five-year $500,000 award will allow her to continue conducting outstanding research. Also, Professor Xinrin Xiao is the only full female professor in this department. Professor Xiao's path to Full Professor at Michigan State came after two post-doc positions, six years of teaching at Concordia University; where she attained tenure and Associate Professor status, nearly nine years of experience at General Motors, and six years as Associate Professor at MSU. Her pathway demonstrates persistence and dedication, this creates hope that the department of ME will introduce more full professors that have done the same.

WOMEN IN STEM AT MSU: COMPARISON OF TEN YEARS OF GROWTH AMONG FEMALE FACULTY IN THE DEPARTMENT OF MICROBIOLOGY & MOLECULAR GENETICS, 2009-2019?
Maggie Bowler
Sociology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 506
Mentor(s): Danita Brandt

Women are underrepresented in STEM fields and careers (1,3). The purpose of this project is to document the current representation of female tenure-track faculty in the Department of MMG at MSU and compare the current situation to that in the department a decade ago. Overall, tenure-stream female faculty have made gains during this decade. Representation of female faculty increased by 10%, and more women now hold honorary titles (University Distinguished Professor, MSU Foundation Professor) than ten years ago. However, the number of Full professors and Associate professors has decreased. The current number of female Assistant professors is up about 3%, sending mixed signals about potential future gains in gender equity.

MSU WOMEN IN STEM: THE NEUROSCIENCE PROGRAM: WHERE ARE WOMEN UNDERREPRESENTED?
Katelyn Cheeseman
Sociology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 507
Mentor(s): Danita Brandt

Women are generally underrepresented in higher-level positions within STEM fields. The purpose of this project is to document whether this general pattern exists in MSU's Neuroscience Program. At Michigan State University, the Neuroscience Program consists of faculty from many different departments. In this study I documented the representation of tenure-track females in the Neuroscience Program from four of the departments affiliated with the Program: Psychology, Pharmacology and Toxicology, Physiology, and Translational and Molecular Medicine. In two of these four departments, women are outnumbered by men, especially at higher academic rank. The exceptions to this pattern are the Department of Translational and Molecular Medicine, in which the number of male and female full professors is equal. Women outnumber men in the Department of Psychology, but they do not hold higher academic rank.

WOMEN IN STEM AT MSU: STATUS OF FEMALE FACULTY NURSING AND COMPARISON TO OTHER BIG 10 SCHOOLS
Bridget Owens
Sociology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 508
Mentor(s): Danita Brandt

Typically, Nursing is thought of as a "woman's profession" seemingly more than any other discipline in STEM. However, simply compiling the number of women and men in Nursing programs does not tell the full story of their status. The intent of this research is to document female faculty in current leadership positions (Dean, Associate Dean) in the College of Nursing at Michigan State University and compare MSU to the other Big 10 Universities. Females still dominate leadership positions in nursing programs throughout the Big 10. In programs that have at least one male dean, the presence of male faculty in leadership positions ranges from 25% to 40%.

MSU WOMEN IN STEM: PAST AND CURRENT GENDER RATIOS AMONG THE FACULTY OF LYMAN BRIGGS COLLEGE
Caitlin Ryan
Sociology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 509
Mentor(s): Danita Brandt

Lyman Briggs College (LBC) is MSU's undergraduate residential college for science, offering its own courses in math, chemistry, physics, and biology. In this project I sought to document whether the general pattern of women being underrepresented in STEM disciplines applied to LBC. Data from the Faculty Directories from 1970-2019 confirm that men outnumbered women in teaching positions over that period and held more tenure-track positions. However, female representation has improved since 1970, and current female involvement is at an all-time high, 29% of tenure-track positions are held by women.

MSU WOMEN IN STEM: H-INDEX ANALYSIS FOR THE DEPARTMENT OF MICROBIOLOGY AND MOLECULAR GENETICS
Tania Styma
Sociology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 510
Mentor(s): Danita Brandt

The h-index, a measure based on the number of a researcher's publications and number of citations of their work, is a metric commonly used in evaluating faculty productivity. However, this metric is variable between databases, and its usefulness has been questioned by many. In this project, I examine h-index values collected from two different sources, Google Scholar and WebofScience. I tested the hypothesis that larger h-index is correlated with faculty rank and I compared h-indexes between male and female faculty at the same academic rank in the department of MMG. Google Scholar H-indices are generally higher than Web of Science (about 14% higher for MSU MMG), reflecting Google Scholar's more extensive index of publications. In the MSU Department of MMG, h-index rises with faculty rank, reflecting more extensive publication records for senior faculty. In MSU MMG, on average, female faculty have a lower h-index at each of the three faculty ranks (Assistant, Associate, Full Professor). However, the gap is smallest at the Assistant Professor level. It would be interesting to track these Assistant Professors over the next five years and follow the evolution of their h-index as they reach the next faculty rank.

WOMEN IN STEM AT MSU: STATUS OF FEMALE FACULTY IN THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Carlie Couzens
Sociology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 511
Mentor(s): Danita Brandt

The science, technology, engineering, and mathematics (STEM) fields include some of the most female deprived parts of the workforce. The Computer Science and Engineering (CSE) department at Michigan State University is no exception to this common trend. Not only does the number of male faculty outnumber women 33:8, but there are also about one-seventh the number of females in tenure track as males. A similar disparity carries through to other Blg 10 schools.

Previous research suggests retention rates in CSE are especially low for women. It is incredibly important for women to enter this field, as with all STEM fields, because the importance of a diverse workforce is well-established.

MSU WOMEN IN STEM: A CURRENT COMPARISON OF WOMEN IN MSUCOM AND MSUCH'S DEPARTMENTS OF PEDIATRICS & FAMILY MEDICINE, AND SURGICAL SPECIALTIES
Nikki Skinner
Sociology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 549
Mentor(s): Danita Brandt

Colleges of Osteopathic and Human Medicine represent two different philosophies. Typically, women are more involved in osteopathy and noninvasive specialties. The purpose of this study was to document whether MSU's medical colleges follow this historical pattern. In this project I documented the differences in the number and status of female faculty compared to male faculty in MSU's Colleges of Osteopathic Medicine and MSU's College of Human Medicine, focusing on the departments of Pediatrics, Family Medicine, and Surgical Specialties. These departments were chosen because they demonstrate different treatment philosophies, invasive and non-invasive. The data supported the historical pattern of more women of higher status in noninvasive specialties in both the College of Osteopathic and Human Medicine. However, MSU's College of Osteopathic Medicine has proportionately fewer women faculty of full professorial status or higher. Future work might explore the underlying reasons for these differences.

DEVELOPING WOMEN AS ICT USERS: A REVIEW OF GENDER AND ICTS FOR DEVELOPMENT
Georgia Artzberger
Sociology, Oral Presentation
Section: 3, 11:00 AM, Mosaic Multipurpose Room
Presentation Number: 891
Mentor(s): Logan Williams

Information and communications technologies (ICTs) are a wide range of infrastructure and devices that enable humans and systems to reliably exchange messages and data. This study looks at the study of gender and technology in developing areas to help us better understand the relationships between the three. Coding was used among articles centered around women, technology, and development in order to find trends in how women use ICTs and how they are researched. Based on gender theory and previous research on women's role with technology, codes and subsequent indicators were developed for different ways women use ICTs. Three original codes were 'Medium for Increased Communication and Spread of Information', 'Scientific Instrument', and 'Allow Outsourcing from the Global North to the Global South'. Through inductive coding, 'Increased Productivity', 'Gendered Fantasies about Technology', 'Commodifying Women', and 'Justice' were also developed. Taking these uses of ICTs, an iterative brainstorming process was done using hierarchical concept maps. The most prevalent codes in the articles were 'Medium for Increased Communication and Spread of Information' and 'Increase Productivity'. 'Scientific Instrument' and 'Allow Outsourcing from Global North to Global South' both received the least amount of indicators and recognition. Through analysis, we found that 'Medium for Increased Communication and Spread of Information' and 'Increase Productivity' are frequently found together because when working together, these concepts are able to efficiently raise women's economic well-being. We also found a significant gap in research in how ICTs commodify women and how their relationship with the technologies changes due to gendered fantasies.

MORE FAT AND LESS FREE THAN WE THINK? ANALYZING (MIS)PERCEPTIONS OF HEALTHCARE AND CRIMINAL JUSTICE STATISTICS
Marissa Rivera, Melissa Bush
Sociology, Oral Presentation
Section: 3, 11:15 AM, Mosaic Multipurpose Room
Presentation Number: 892
Mentor(s): Eric Beasley

We examined undergraduate survey respondents' answers to questions relating to criminal justice and human health. Our main goal was to gauge the accuracy with which these students estimate various known facts (e.g. the United States incarcerated population, arrest rate for marijuana possession, national rate of obesity and mental illness, etc.) taking into account demographic variables such as gender, race, economic background, etc. In addition to hypothesizing why certain groups of people have such views, we discuss the societal, political, and economic ramifications of these perceptions/misperceptions.

USING 3D PHOTOGRAMMETRY AND DIGITAL MORPHOMETRICS TO STUDY CHANGES IN MANDIBULAR FORM AS A RESULT OF CRANIAL MODIFICATION
Peter Mercier
Sociology, Oral Presentation
Section: 3, 12:00 PM, Mosaic Multipurpose Room
Presentation Number: 893
Mentor(s): Gabriel Wrobel

Digital morphometrics and 3D photogrammetry (constructing digital 3D models from a series of photographs) provide physical anthropologists with an accurate and efficient means to collect, preserve, and analyze fragile skeletal remains and bioarchaeological data. Building on previous digital morphometric studies, this project seeks to understand the interrelationships between osteological body modifications of the ancient Maya from central Belize. The ancient Maya commonly practiced intentional cranial shaping through various apparatuses to achieve desired head shapes. My specific research question regards morphological changes in the human mandible that are reactionary to the cranial modification process. Studies on ancient Peruvian crania confirm a relationship between cranial modification and subsequent morphological changes in the mandible, particularly the intercondylar breadth. Using 3D photogrammetry and digital morphometrics, my project will address this morphological relationship between the mandible and the cranium for an ancient Maya collection. I will test if there are statistically significant physical distinctions between mandibles associated with modified versus unmodified crania in an attempt to further our understanding of the cranial shaping practices for the ancient Maya. Understanding the morphological responses of cranial modification (be it anywhere on the skull) has great bioarchaeological implications. In this case, the mandible can act as a proxy for identifying the presence or absence of cranial modification when cranial preservation is poor or absent altogether. This study adds to our understanding of an important biocultural practice of an ancient society by utilizing digital methods when traditional methods may not be possible.

LAY PERCEPTIONS AND MISPERCEPTIONS OF U.S. DEMOGRAPHIC AND FEDERAL SPENDING STATISTICS
Ben Conte, Meri Michael
Sociology, Oral Presentation
Section: 3, 11:30 AM, Mosaic Multipurpose Room
Presentation Number: 894
Mentor(s): Eric Beasley

In Fall 2018, we asked over four-hundred undergraduates to give estimates of certain demographics (illegal/undocumented immigrants, Social Security recipients, veterans, etc.) and federal spending statistics (health care, foreign aid, defense, etc.). In doing so, we discovered that our sample, as a whole, misestimated to a large degree several known U.S. demographic and federal government spending facts. For example, respondents estimated the U.S. correctional population as being more than eleven times larger than its actual size and estimated the population of persons without health insurance as being more than four times larger than its actual size. In our paper, we examine how these estimates (and others) vary according to the respondent's demographic characteristics. The biggest difference of note was that Black respondents, on average, perceived the correctional population as more than twice as large (42.9% of the total U.S. population) as White respondents (18.4% of the total U.S. population), while both White and Black respondents perceived the correctional population as much larger than its actual size (2.0% of the total U.S. population). The implications of our study, including behavioral and political ramifications, will be discussed.

CONTINGENT EFFICIENCY?: ASSESSING PREPAID WATER METER IN PALESTINE
Faizan Ali
Sociology, Oral Presentation
Section: 3, 11:45 AM, Mosaic Multipurpose Room
Presentation Number: 895
Mentor(s): Stephen Gasteyer

International donors and water policy specialists propose prepaid water meters (PPWM) to increase utility financial solvency and water use efficiency. Scholars, however, disagree about the utility and equity of prepaid water meters. Some argue that PPWM improve utility cost recovery, financial management, and water use efficiency. Others argue that the technology enforces draconian rates on water customers, placing the utility goals of rate collection and efficiency at odds with affordability and human needs. These literatures presume dramatically different water costumer preference for the technology. This paper examines the impacts on PPWMs on households in three governorates of the West Bank, Palestine. Based on face to face surveys of 489 household representatives in urban, rural, and refugee camp facilities in Hebron, Ramallah, and Tulkarm governorate of the West Bank, we assess the household perceptions of prepaid water

meters. Our findings indicate that opinions about pre-paid meters are highly contingent on the intermittency of supply ? a majority of residents were positive about PPWMs when water supply was reliable and consistent, and negative when supply was intermittent. Further, rural residents were more positive about PPWM, possibly because shut offs could be mitigated through extended family networks. This paper, then, argues against a fetishization of PPWM as a technology. Instead, we argue that water user preference for PPWM ought be understood as contingent on the reliability of the water supply, and social networks to facilitate payment when shutoffs happen.

TOXICOLOGY & PHARMACOLOGY

DISCOVERY AND ANALYSIS OF EPOXYEICOSATRIENOIC ACID RECEPTOR
Sidney Lipovsky
Toxicology and Pharmacology, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 471
Mentor(s): Kin Sing Lee, Devon Dattmore

Epoxyeicosatrienoic acids (EETs) are fatty acids metabolized from arachidonic acid by cytochrome P450's (CYP's). EETs exhibit multitudes of beneficial physiological effects which might be utilized in treatments of cardiovascular and renal diseases, as well as diseases of an inflammatory nature (such as Crohn's disease), due to their anti-inflammatory properties. However, EETs are hydrolyzed by soluble epoxide hydrolase (sEH) to form dihydroxyeicosatrienoic acids (DHETs), which do not retain many of the same beneficial properties as EETs. There is evidence that EETs exert their effects through a surface membrane-bound receptor whose identity is yet to be determined. Thus, elucidation of the EET receptor would be a great contribution to the field of medicine. Our research includes the synthesis of EETs from arachidonic acid and the subsequent purification using flash and high performance liquid chromatography (HPLC). Once purified, we make an EET-probe by attaching a photo-affinity tag which allows for purification of the probe (and anything bound to it) in an in-vitro assay using smooth-muscle cells. Thus, when the EET receptor and EET-probe bind, we can then use the properties of the probe to isolate the receptor for analysis using HPLC-MS/MS. Knowledge of the receptor might lead to the development of pharmacological agents that mimic EETs, but are less easily metabolized.

INFLUENCE OF ENDOCYTOSIS ON DRUG DELIVERY EFFICIENCY
Mckenna Coskie, Hannah Cavagnetto
Toxicology and Pharmacology, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 472
Mentor(s): Daniel Vocelle

Poor delivery into the cell prevents therapeutics from being as effective as they potentially can be, possibly due to the use of inefficient endocytic pathways. In light of newly discovered endocytic pathways, we are looking into the role of previously unknown Clathrin- and Caveolin-independent pathways in active drug delivery. To address this problem, we are using endocytic inhibitors to determine the functionality of different endocytic pathways in the active delivery of short interfering RNA (siRNA). A set of inhibitors were used to target certain proteins that facilitate endocytosis and intercellular trafficking across four different cell lines: H1299 (Lung), HeLa (Cervical), HEK293 (Kidney), and HepG2 (Liver). By measuring the intracellular level of fluorescent siRNA and its target, enhanced green fluorescent protein (EGFP), we were able to quantify siRNA delivery and silencing of the target protein for a particular mode of entry and further characterize if the given pathway facilitates silencing. To date, our results indicate that for each cell line, some endocytic pathways are optimal for drug delivery and activity, while others did not facilitate silencing of the target protein. The optimal pathway for siRNA delivery was also found to vary across cell lines.

COMPARISON OF METHODS TO MEASURE SILICA-INDUCED CELL DEATH IN CULTURED MACROPHAGES AND PROTECTION BY OMEGA-3 FATTY ACID DHA
Shamya Harris
Toxicology and Pharmacology, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 473
Mentor(s): Madduma Hettige, Lichchavi Rajasinghe, James Pestka

Phagocytosis of crystalline silica (cSiO2) by alveolar macrophages can facilitate the clearance of pulmonary inflammation of respiratory exposure to cSiO2, but it can also result in cell death. The objective of this study is to understand long-term effects of cSiO2 on cultured ASC-transfected RAW 264.7 macrophages(Mphs) using three cell death quantification methods and determine how these responses are impacted by the omega-3 fatty acid docosahexaenoic acid (DHA) found in fish oil. Mphs were seeded at a concentration of 1.25 x10^5 cells/mL. DHA was added to the cells after 12 hr. After 20 hr, cSiO2 was added. Cell viability was determined after 16 hr by measuring 1) intracellular mitochondrial activity by MTS assay, 2) membrane integrity by the lactate dehydrogenase (LDH) assay, and 3) cell staining by propidium iodide (PI) and Hoechst staining to visualize the dead and live cells. The live cell percentage from MTS assay was 70 % with 25μg/mL of cSiO2 and 0% with 75μg/mL of cSiO2. The cell death percentage from the LDH assay was 19% with 25μg/mL of cSiO2 and 40% with 75μg/mL of cSiO2. The cell death percentage from cell counts was 80 % at 25 μg/mL of cSiO2 and 100 % at 75 μg/mL of cSiO2. DHA incubation resulted in cell death protection against 25 μg/mL cSiO2 for 16 hr in all the methods that we tested. In general, the MTS assay appeared to be most effective in discriminating death after cSiO2 treatment. The LDH assay was less effective possibly because of intracellular breakdown of the enzyme following autophagy. The cell counting method was also problematic due to error generated by live cells phagocytosing dead cells. Future studies will therefore employ the MTS method for studying mechanisms of DHA protection of macrophages against cSiO2-induced death.

NASAL ACCUMULATIONS OF INNATE LYMPHOID CELLS IN MICE EXPOSED AND RE-EXPOSED TO OZONE
Elyse Eldridge
Toxicology and Pharmacology, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 474
Mentor(s): Jack Harkema, James Wagner

Exposure to high levels of ozone (O3, a gaseous air pollutant) has been associated with eosinophilic rhinitis in children. O3-induced eosinophilic rhinitis and type 2 immunity in mice depend on group 2 innate lymphoid cells (GATA3+ ILCs). This study was designed to determine the distribution, density and persistence of GATA3+ ILCs and major basic protein+ eosinophils in the nasal mucosa of O3 exposed mice. Male C57BL/6 (T & B cell- and ILC-sufficient), Rag2-/- (T & B cell-deficient, ILC-sufficient), and Rag2-/-Il2rg-/- (T & B cell- and ILC-deficient) mice were exposed to 0 ppm (filtered air, FA) or 0.8 ppm O3 (4h/day) for 9 consecutive weekdays and sacrificed 1 day post-exposure. Some mice were exposed for 1 day to FA or O3 after a 17-day post-exposure. Nasal tissues were processed for light microscopy, immunohistochemistry and morphometry. GATA3+ lymphoid cells were sparse in FA- and 1-day-O3-exposed ILC-sufficient mice, and absent in ILC-deficient mice. In contrast, 9-day O3 exposures induced rhinitis with increased eosinophils and GATA3+ lymphoid cells in ILC-sufficient mice, but not ILC-deficient mice. Eosinophils and GATA3+ lymphoid cells waned 17 days post-exposure in ILC-sufficient mice. Eosinophils, but not GATA3+ cells, increased with a single re-exposure to O3 in ILC-sufficient mice. These results demonstrate that 1) repeated exposures to O3 cause a nasal influx of GATA3+ ILCs that coincides with eosinophilic rhinitis, 2) O3-induced influx of eosinophils and GATA3+ ILCs attenuate with time post-exposure, and 3) a 1-day re-exposure to O3 causes rapid recall of eosinophils without a concomitant increase in GATA3+ ILCs.

PURIFICATION AND CHARACTERIZATION OF SELECT GAO MUTATIONS ASSOCIATED WITH NEUROLOGICAL DISORDERS
Josiah Quinn
Toxicology and Pharmacology, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 475
Mentor(s): Richard Neubig, Vincent Shaw

Gα subunits, along with Gβ and γ, comprise the heterotrimeric G protein. This protein is a critical component in signaling via G-protein coupled receptors (GPCRs), a class of receptors that play a role in the pharmacology of many disease states. Several $G\alpha_o$ mutations have been shown to cause pronounced neurological complications including

encephalopathies and movement disorders. In $G\alpha_o$, gain-of-function (GOF) and normal-function (NF) mutations are primarily located in the RGS binding domain while loss-of-function (LOF) mutations are concentrated around the GDP binding domain. To produce mutated proteins, transformed BL21 DE3 competent cells were grown in an enriched media blend and treated with 30μg/ml IPTG. The combination of a nickel column and gel filtration was used for purification. After purification, a gel of each protein was run to ensure sufficient purity of our product. We plan to characterize three mutations, two of which have clinical relevance. A G184S (GOF) mutation was used as a positive control. This $G\alpha_o$ variant has been previously shown to demonstrate Regulator of G-protein Signaling (RGS) protein insensitivity. $G\alpha_o$ G203R (GOF) is associated with epileptic encephalopathies in patients, while R209H (NF) is associated with movement disorders. We are interested in the differences these proteins have in RGS binding affinity and rate of GDP exchange. We hypothesize that G184S and G203R will show impaired RGS binding that leads to the increased $G\alpha_o$ activity associated with epileptic encephalopathies, and, R209H will show impaired GDP exchange, leading to decreased $G\alpha_o$ activation and the development of movement disorders in patients.

EFFEROCYTOSIS OF APOPTOTIC CELL CORPSES BY ALVEOLAR MACROPHAGES (AMPH) IS ENHANCED BY THE OMEGA-3 DOCOSAHEXAENOIC ACID (DHA)
Augie Evered
Toxicology and Pharmacology, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 476
Mentor(s): James Pestka, Madduma Hettige Lichchavi Rajasinghe

Exposure to crystalline silica has been linked to the autoimmune diseases including lupus. From our prior work, intranasal instillation of silica triggers autoimmunity in lupus-prone mice and furthermore, that consumption of DHA reduces the response. AMph phagocytose silica ultimately resulting in their death via mechanisms including apoptosis and necroptosis. Inefficient removal of cell corpses by efferocytosis contributes to inflammation, autoantibody production, and lupus. Here we tested the hypothesis that prior DHA supplementation influences the efferocytosis of apoptotic RAW 264.7 macrophage (RAW) corpses by the alveolar macrophage surrogate Max Planck Institute (MPI) cells. RAW cells were pre-incubated with or without DHA (25 μM), labeled with pHrodo red dye, then apoptosis was induced by incubation with staurosporine (0.5uM). Resultant apoptotic cell corpses were then incubated up to 4 hours at a 1:3 ratio with CFSE-green labeled MPI cells that were pre-incubated with or without DHA (25 μM). At the end of co-culturing, free ASC-RAW corpses were washed away and the percentages of individual MPI cells and internalized corpses by MPI cells were calculated from images captured by an EVOS FL2 microscope. The time course analysis revealed that MPI cells reached maximal efferocytosis index of 80 % within 2 hours of co-culturing. The highest clearance of apoptotic corpses was observed at 1 hour when the ASC-RAW cells were pre-incubated with DHA. This study suggests that DHA supplementation enhanced the efferocytic capacity of AMph. Therefore, the improvement in efferocytic capacity of AMph may be related to suppressed systemic autoimmunity in lupus-prone mice consuming DHA.

ALLERGIC INFLAMMATORY AND MUCOUS CELL RESPONSES TO LIVESTOCK FARM-DERIVED PM2.5 ASSOCIATED WITH THE SOURCE OF THE PARTICULATE MATTER
Sarah Shareef
Toxicology and Pharmacology, Poster Presentation
Section: 1, 11:00 - 12:30 PM, Lake Huron Room
Presentation Number: 477
Mentor(s): James Wagner

Airborne fine particulate matter (PM2.5) derived from livestock farming is a combination of dusts, biogenic materials and anthropogenic emissions. Allergic individuals that work in or live near high density animal operations may be at a higher risk for adverse health effects associated with exposure to particulate pollutants. We tested the hypothesis that exacerbation of allergic airway responses to livestock farm particles is dose-and-source-dependent. We collected PM2.5 from two chicken farms, two pig farms, and two goat farms in the Netherlands. Female BALB/c mice (6-8 weeks old) were sensitized and boosted with ovalbumin (OVA; days 0, 10, respectively), and then challenged with intranasal saline or OVA for 2 consecutive days (days 17, 18) prior to a single intranasal exposure to 0, 0.9, or 3 μg of farm-derived PM2.5. Twenty-four hours later mice were euthanized and bronchoalveolar lavage fluid (BALF) was collected for differential cell analysis and lung tissues were processed for light microscopy to analyze intraepithelial mucosubstances (IM). OVA sensitization and challenge induced allergic airway inflammation, indicated by accumulation of eosinophils in BALF and increased IM in conducting airways. PM2.5 alone had no adverse effects, but increased BALF eosinophils in allergic airways (rank potency goat PM>>pig PM>chicken PM). However, no farm particles affected OVA-induced IM increases in allergic mice challenged. Our results suggest that exacerbation of allergic airway inflammatory responses by livestock-

farm associated PM2.5 caused an exacerbation in BALF inflammatory cells but not in epithelial remodeling and mucous production.

USING C. ELEGANS TO DISCOVER THE PHYSIOLOGICAL BENEFITS OF POLYUNSATURATED FATTY ACIDS
Benjamin Kessler
Toxicology and Pharmacology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 541
Mentor(s): Kin Sing Lee

Omega-6 (n-6) and omega-3 (n-3) are polyunsaturated fatty acids (PUFAs) that humans cannot endogenously synthesize, so they must be obtained from exogenous sources. It is neither known how much n-6 and n-3 are required in the human diet nor what the physiological consequences of different quantities of these PUFAs and their metabolites are in the body. PUFAs play an important role in the development and maintenance of many cellular and organ systems, and having a deeper understanding of how they function would be valuable information in a clinical setting. This study uses C. elegans as a model organism to investigate PUFAs. C. elegans are inexpensive to maintain, their cells and organs are easily seen through their transparent bodies, they have similar PUFA metabolic pathways to humans, and they have a short lifespan which allows phenotypic responses to the aging process to be observed. Lifespan assays have been conducted using fat-1mutants which lack the ability to convert n-6 PUFAs into n-3 PUFAs, and they have shown a decrease in lifespan when compared to the wild-type (N2). Preliminary lifespan assays using fat-1mutants treated with MDY, a drug thought to increase intestinal integrity, have shown an increase in lifespan. Further experimentation may involve: intestinal integrity testing in order to determine if n-3 PUFAs and their metabolites are beneficial to the gut microbiota or intestinal cell walls; mobility tests to observe the physiological role PUFAs play in preventing nerve damage; and free radical testing to study how PUFAs may reduce oxidative stress.

IDENTIFICATION AND QUANTIFICATION OF DESLORELIN VIA ENZYMATIC CLEAVAGE BY GC-MS/MS
Christine Wei
Toxicology and Pharmacology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 542
Mentor(s): John Buchweitz

Deslorelin is a 1282 molecular weight gonadotropin releasing hormone (GnRH) agonist drug, which is used in veterinary medicine for the purpose of promoting ovulation and stabilizing high-risk pregnancies in livestock and pharmacological contraception in males. It is generally applied as a drug-releasing implant. The compound is very potent to low concentrations, has a long half-life and is difficult to measure quantitatively in serum. Currently, only quantitative method available is Enzyme Linked Immunosorbent Assay, which is fairly non-linear and non-specific, and is only useful during the initial period following implantation. Our lab has developed a method for analyzing Deslorelin indirectly, yet specifically, by cleaving a unique portion of the protein carboxy terminus containing a modified proline (Pro-HNEt), which can be removed by the enzyme Clostrapain (specific for peptide bonds after Arginine). Pro-HNEt can be extracted from digested serum and reacted to give an N-t-butyldimethylsilyl derivative that is analyzed by tandem quadrupole Gas Chromatography-Mass Spectrometry (GC-MS/MS). Instrument settings have been optimized to give detectability of unextracted ProHNEt to 10 ppt, and derivatization has been optimized for maximum yield by adjustment of solvent type, reaction time, temperature and use of additives such as dimethylformamide (DMF), tetradecanol and hydrochloric acid. The final method will be used to measure Deslorelin in serum samples from a variety of zoo animals including tigers, and in small animal such as cats and ferrets from clinical veterinary practices.

EFFECT OF TOPICALLY ADMINISTERED NETARSUDIL (RHOPRESSA) ON INTRAOCULAR PRESSURE IN NORMAL DOGS AND DOGS WITH OPEN-ANGLE GLAUCOMA
Kelly Leary
Toxicology and Pharmacology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 543
Mentor(s): Andras Komaromy, Zach Laubach

Glaucoma is an irreversible optic neuropathy and a leading cause of blindness in humans and dogs. The main risk factor intraocular pressure (IOP). Elevated IOP results in the degeneration of the optic nerve and subsequent vision loss. The purpose of this study was to test safety and efficacy of the eye drop medication netarsudil (Rhopressa™, Aerie Pharmaceuticals) for the first time in dogs. Netarsudil is the first glaucoma drug that specifically targets the trabecular

meshwork to improve fluid drainage from the eye and lower IOP; it has been recently FDA approved for human use. We tested the topical administration of netarsudil in normal dogs (n=5) and in dogs with open-angle-glaucoma (OAG) due to a mutation in the ADAMTS10 gene (n=5). The animals were between 1-2.7 years old. In each dog left or right eye was randomly selected for topical netarsudil treatment. Contralateral eyes served as controls and were sham treated. Following a 1- week baseline period, dogs were treated once daily (q24hr) during week 2, and twice daily (q12hr) during week 3. Efficacy was evaluated and compared between treated and sham eyes within each group by diurnal IOP and pupil size measurements. Safety was assessed by conjunctival hyperemia, comfort level, central corneal thickness, ophthalmic examination, and gonioscopy. We found that netarsudil did not result in a significant reduction of IOP in normal and OAG dogs. However, the use of netarsudil was associated with moderate to severe conjunctival hyperemia in all animals. There were no other adverse effects.

OPTIMIZING SCREENING ASSAYS FOR NEW ANTI-INFLAMMATORY DRUGS FOR THE PREVENTION AND TREATMENT OF CANCER
Owen Mitchell
Toxicology and Pharmacology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 544
Mentor(s): Karen Liby

Cancer remains one of the leading causes of death in the United States and the need for new prevention and treatment options is imperative. The synthesis of new anti-inflammatory drugs is a promising area for therapeutic intervention, as inflammation plays a pivotal role in tumor survival, growth and migration. Several screening assays are used to test new drugs and to prioritize lead compounds. The alkaline phosphatase assay is used to quantify the ability of a drug to inhibit the NF-κB pathway; this pro-inflammatory transcription factor is persistently active and leads to tumor cell survival, proliferation and metastasis. First, the parameters of the assay were optimized: RAW264.7 macrophage-like cells were plated at densities of 25,000-100,00 cells/well in a 96-well plate, stimulated with 1-5 ng/ml lipopolysaccharide (LPS) and treated with drugs. Optimized conditions for this assay are 50,000 RAW264.7 cells/well stimulated with 1 ng/ml LPS and treated with serial dilutions of drug starting at 10 μM. New compounds are also screened to determine their efficacy for inhibiting nitric oxide synthase (iNOS), an important enzyme in the innate immune response. RAW264.7 cells (50,000/well) were stimulated with 1 ng/ml LPS and treated with serial dilutions of drug (starting at 1 μM) and then quantified using the Griess reaction. To determine mechanism of action, RAW cells will be transfected with different deletion constructs of the iNOS promoter and treated with drugs. These tests will help assist in the design and synthesis of additional anti-inflammatory drugs and guide further *in vitro* and *in vivo* investigations.

NOVEL LIPID DROPLET QUANTIFICATION SYSTEM FOR PHENOTYPIC ANALYSIS OF ADIPOCYTES USING CELLPROFILER
Victoria Adomshick
Toxicology and Pharmacology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 545
Mentor(s): Almudena Veiga-Lopez, Yong Pu

Adipogenic differentiation is the process by which preadipocytes become mature adipocytes, cells that store energy and regulate metabolic homeostasis. During differentiation, lipids accumulate in adipocytes and can be detected using a bodipy stain as an index of differentiation. Recent work suggests that environmental chemical exposure can dysregulate adipogenic differentiation. However, imaging tools that allow us to better assess lipid droplet formation and size remain at their infancy. The aim of this study was to develop an accurate, standardized approach to quantify lipid droplet size of mature adipocytes and a clustering approach to analyze the total lipid content per adipocyte. To assess their size, we used two approaches; 1) the free online computer software of reference, ImageJ, and 2) another free online computer software, CellProfiler. For ImageJ, we used the already developed macro, "Analyze Particles", specifically designed to identify particles and quantify their area. For CellProfiler, we developed an in-house "pipeline" to detect individual droplets using fifteen already available modules. We compared both approaches by analyzing the number of lipid droplets identified, the distribution of lipid droplet sizes and the percent positive lipid area in over fifty images. Our preliminary results show that ImageJ identified fewer lipid droplets and with a greater variance in lipid droplet size. The CellProfiler pipeline also allowed evaluation of the total lipid content per adipocyte. In conclusion, CellProfiler streamlines the lipid phenotypic analysis of adipocytes providing with a novel tool for evaluation of dysfunctional adipogenesis that is currently not possible with other traditional analysis methods.

ELUCIDATING THE PATHOPHYSIOLOGY OF CONTRAST-INDUCED ACUTE KIDNEY INJURY WHILE SEARCHING FOR PROPHYLACTIC DRUG THERAPIES
James Teuber
Toxicology and Pharmacology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 546
Mentor(s): Adam Lauver

Iodinated contrast agents are commonly used in imaging procedures that require visualization of the vasculature. The use of these agents is frequently associated with acute kidney injury. Contrast induced acute kidney injury (CIAKI) is the third most common cause of hospital-acquired nephropathy, accounting for approximately 11 percent of all cases. Despite the frequency of CIAKI, the underlying mechanism remains unclear. Experimental and clinical studies have shown that epithelial cells in the renal proximal tubule are affected by this injury. My research aims to elucidate the pathophysiology of CIAKI while simultaneously screening for prophylactic treatment strategies to prevent the disease. In this study, we have investigated the cytotoxic effects of a commonly used contrast agent, iohexol, using a luminescence-based cell viability assay. Treatment of renal proximal tubule epithelial cells (RPTEC-TERT1) with increasing concentrations of iohexol causes increased cytotoxicity. Interestingly, when pure iohexol powder was dissolved in cell media at the same concentration of commercial iohexol solution (Omnipaque®), the dissolved powder caused less toxicity suggesting potential effects by excipient components. Further studies will need to be done to determine possible causes for and implications of this observation. By targeting different parts of the proposed pathways through which CIAKI manifests itself, I hope to find compounds that may help minimize the cytotoxicity that these contrast agents produce. Drug targets that have been prioritized in our studies include phosphodiesterase-5, an important enzyme in regulating vascular tone, and enzymes involved in the detoxification of reactive oxygen species.

EFFECTS OF THC ON MONOCYTE REGULATED NEURO-INFLAMMATION IN HIV PATIENTS
Alyssa Maturen
Toxicology and Pharmacology, Poster Presentation
Section: 2, 1:00 - 2:30 PM, Lake Huron Room
Presentation Number: 547
Mentor(s): Robert Crawford, Norbert Kaminski, Mike Rizzo

Due to the nature of HIV, patients with the disease can often develop neuroinflammation. This is clinically important because approximately 30-50% of HIV patients have cognitive impairment, and neuroinflammation has been found to be a critical mechanism in development of cognitive dysfunction. A major contributor of this neuroinflammation is the influx of monocytes into the brain, which in turn can promote astrocyte release of pro-inflammatory cytokines and chemokines. Many HIV+ patients use cannabis to relieve their symptoms. ?9-tetrahydrocannabinol (THC), found in cannabis, has been widely established as being immune suppressive and anti-inflammatory. The major receptors by which THC modulates cell activity are CB1 and CB2. Previous studies have demonstrated a CB2 agonist (JWH-015) promotes a similar suppression of IL-1beta as THC, suggesting that THC is, in part, modulating monocyte activity through CB2. The objective of my study is to determine whether the magnitude of suppression by THC on IL-1beta production correlates with CB2 (and CB1) mRNA levels in monocytes. My hypothesis is that increased levels of CNR2(CB2) mRNA in monocytes will correlate with a higher magnitude of suppression of IL-1beta by THC.To address my hypothesis, monocytes will be isolated from human donors (HIV-negative) and the magnitude of IL-1beta suppression by THC will be determined. Furthermore, RNA will be isolated from monocytes to evaluate the expression of CNR1 (CB1) and CNR2 (CB2). To conclude, a better understanding of the mechanisms by which THC is acting can lead to developing therapeutic drugs that lessen the neuroinflammation present in HIV+ patients.

VISUAL & PERFORMING ARTS

THE FRESH OPPORTUNITY GREEN MAP: A COLLABORATIVE APPROACH TO SUSTAINABLE COMMUNITY DEVELOPMENT
Rose Deneau
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 15
Mentor(s): Kelly Salchow MacArthur

Despite being a major agricultural producer in Michigan, Monroe County faces obstacles to equitable food access. This impetus led the county to seek a "green map" solution to increase awareness of sustainable community development opportunities, while also highlighting the disproportional access to food in USDA designated food deserts, both within the city of Monroe and the greater county area. Influenced by the global Green Map project, which aims to connect through inclusive participatory action in sustainable community development via the creation of community-made maps, a county-wide map was designed for Monroe. Noted were food banks, farmers markets, recycling centers, community gardens, and other notable "green-based" landmarks within the county using the Green Map System of icons and tools. Reusable shopping bags were created and distributed to the community, in an effort to diminish single-use plastic or paper bags. The process of developing the map, as well as the community's reaction to and use of it and its accompanying awareness materials will be the focus of this presentation. By engaging the community in the collective use of green mapping, it is anticipated that it will lead to increased social engagement, understanding of sustainable community development, and residents' feelings of connectedness to the community.

COIN-OP CARNIVAL: ELECTRIFYING TALES OF MECHANICAL CONTRAPTIONS
Lora Root
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 16
Mentor(s): Ryan Claytor

Originally conceived during the Great Depression era in the United States, coin-operated games and devices have come a long way in terms of complexity and lasting impact. The earliest versions of these games included indoor derivatives of lawn-ball games, including croquet and bocce ball, but with the eventual added elements of the aforementioned coin-operation as well as electromechanics, pinball and other tabletop ball games were adapted into their more recognizable, modern-day form. The purpose of this research project stems from tracing the impact of these games and representing this information in visual format in partnership with the promotion of MSU's Comic Art and Graphic Novel minor. Interview and biographical material was formatted to be read in comic form in Professor Ryan Claytor's Coin-Op Carnival, which marries coin-operated amusement devices and their history with the comics medium.

A CLOSET REDESIGN MODEL FOR ALZHEIMER'S DISEASE PATIENTS TO IMPROVE THEIR WAY OF LIFE, AND AID FAMILY MEMBERS AND CAREGIVERS
Valeria Obando
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 17
Mentor(s): Zachary Kaiser

Alzheimer's is a disease that not only affects the person who suffers from it, but it also affects those around them, deeply impacting the family of the patient and requiring constant attention from caregivers. This proposal for a redesigned closet seeks to examine ways to maintain the independence of those being affected by Alzheimer's and to reduce the amount of intervention needed by caregivers, specifically in the morning hours. The proposed design, which is modular in nature, could enhance the patient's skills and give them more freedom, as well as helping them maintain some skills and cognitive abilities that might be affected by Alzheimer's. This design proposal aims to help ease the life of the person suffering this disease, the family, and the caregivers.

PRETTY DEADLY: AN EXPLORATION OF CREATIVE DESIGN CONCEPT DEVELOPMENT
Chantel Booker
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 18
Mentor(s): Theresa Winge

My research focuses on a fashion design that I created for an Architectural and Botanical Mash-up Fashion Show. The fashion design was inspired by the mashup between the Fox Theatre in Detroit and the Foxglove plant. Before forming a concept, I researched both the Fox Theatre and the Foxglove to find commonalities between the two subjects and develop a perspective. The research I completed led me to three different design solutions. Concept #1: Things are not always what they seem ? falling for temptation can be deadly. Concept #2: Beauty comes at a price ? is it worth it in the end? Concept #3: Inside and Out ? inside the plant and outside the theatre. My research presentation poster focuses on the design process I used to generate three different design ideas from the same two elements of inspiration. I explore

the creative design concept development process by first searching my subject to gain a better understanding. Next, I think of what perspective I want to give my subject. Then, I search for inspiration images that are visual representations of the perspective I am trying to visually convey with my design, these images are used to create my design mood board. After creating a mood board, I sketch possible designs using the images from the mood board to inspire the forms and elements of my final design. After which, I select the design I will construct and show in the fashion show.

BLURRING BINARIES: QUEERING POETRY AT THE INTERSECTION OF THE PERSONAL & THE POLITICAL
Cassie Feith
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 19
Mentor(s): Divya Victor, Ellen McCallum

This work is a collection of visual poetry that brings together critical and creative methodologies to undertake the representation of social justice as well as embodied gender & sexual identity. The blurring of binaries (the personal and the political) through content and form is crucial to addressing the violence of homophobia and transphobia, while also taking up space in dominate domains to relay messages of queer love, explorations, and identity. This work develops the theoretical and poetic contributions of Judith Halberstam, Elizabeth Freeman, CAConrad, Audre Lorde, Emji Spero, and others. In conversation with these thinkers and poets, the work engages ideas of queering time and space through the manipulation of form and language, while also recognizing form as a kind of language.

SUSTAINABILITY AND ART: PLASTIC INSTALLATIONS
Noelle Tucker
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM, Ballroom
Presentation Number: 20
Mentor(s): Allison Goralnik

The problem of plastic pollution is not one that will be solved easily, but many artists around the world are turning garbage into masterpieces to raise awareness on sustainability. In this presentation, I will share the variety of installations that have been created with plastic bags, bottles, and ocean waste. I will also share the steps that have been taken by a team of artists and researchers at Michigan State to create an installation made of plastic bags on our own campus, as well as the reasons behind creating art to better the environment.

PICK THIS, NOT THAT: THE STUDY OF HOW MUSIC CAN INFLUENCE CHOICE
Nathalie Nordan
Visual and Performing Arts, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 106
Mentor(s): Alexis Bacon

The purpose of this study is to determine how music can be used to influence choice during an interactive performance. For this study I will compare how different aspects of music, specifically tempo and major and minor keys, can impact decision-making. In western culture, major keys are associated with happy moods and minor keys are associated with somber moods. A subject tasked with choosing between a negative and positive option is hypothesized to pick the option that fits the mood of the music playing. With this thinking, music in a major key would make a subject pick the more happy or positive option, while minor key music would make the subject pick the negative or somber option. Additionally, I hypothesize a change in tempo will change the time response of choices: faster tempo will create faster decisions, and slower tempo will illicit slower decisions. The first part of this study requires groups of subjects will be asked to listen to music and rate on a Likert scale how closely what they are feeling from the music matches a certain mood. Based on the responses, the second part of the study will test how the music can influence decisions. Subjects during the performance will be asked to make a decision between a positive or negative outcome. Their response rate and time taken to respond will be recorded.

SHARK! THE MUSICAL: USING A WEB-BASED APPLICATION TO PROMOTE AUDIENCE INTERACTIVITY
Kathryn Pereira, Lukas Richters
Visual and Performing Arts, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 107
Mentor(s): Alison Dobbins

Shark! the Musical is an interactive narrative that uses a web-based application to allow the audience to control many aspects of the show. The goal is to convert the audience from passive observers to active participants. Shark!'s plotline changes based on the choices the audience makes through voting and other activities. Interactive activities vary in how many people participate in them and what exactly they are controlling, i.e., lights, music, or even the embodiment of the shark. The server side of the program is adaptable to allow changes to the order/content of the activities depending on the path of the current show. Through this research, we hope to develop an intuitive web-based application that will enhance the performances of and gradually increase the audience's participation in Shark! the Musical. During development, we hope to ensure that activities do not compete in attention with the stage, are adaptable based on the needs of the show, and are simple enough to be easily comprehended while still being enjoyable and meaningful. We will measure our success through a short, post-performance survey and observing the audience's engagement throughout the show.

MODERN DAY STORYTELLING: AN INTERACTIVE MUSICAL
Casey Gerlach, Casey Hansley, Polina Stoppa
Visual and Performing Arts, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 108
Mentor(s): Alison Dobbins

The shark is oftentimes used to convey the symbol of evil in modern cultures; from Jaws to Sharknado, sharks have instilled fear into viewers with its theatrical uses. Numerous techniques in theater, such as the shark, are used to represent evils in society in abstract forms. This approach plays a large part in the entertainment value of the show and audiences are typically separated from the overall plotline onstage. This encourages the question: what if the audience was an integral part of how the storyline played out? For our research, we are a part of a team of theatrical arts instructors and developers working together to design an interactive musical. We use the shark as the embodiment for tension and a metaphor for the fear of change. Our research goal is to develop a script that allows for audience authorship. As we delve into the intricacies of modern-day storytelling through the hero's journey, we will explore the possibilities of being in control of a story - unlike one ever seen before.

THE DING DONGS SCENIC DESIGN
Brandon Barker
Visual and Performing Arts, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 109
Mentor(s): Kirk Domer

I have been asked to work with Professor Kirk Domer on a professional design project. The play we will be designing is *The Ding Dongs or What Is The Penalty In Portugal.* We will be working with the Kickshaw Theatre, which is a new theater company that does productions that explore human existence. *The Ding Dongs* is a play about land rights, and the right of possesion over things that aren't necessarily yours. I will be working with Mr. Domer to explore the scenic expression of the play. Together we will design the set by infusing our concept with the physical requirements of the play and space. I'm very excited for this challenge and can't wait to share the experience.

IT'S A WONDERFUL LIFE: A LIVE PRESENTATION OF DESIGN
Michael Gault
Visual and Performing Arts, Poster Presentation
Section: 2, 11:00 - 12:30 PM, Ballroom
Presentation Number: 110
Mentor(s): Kirk Domer

For It's A Wonderful Life: A Live Radio Play (By Joe Landry). Michael Gault served as the assistant scenic designer to Kirk Domer. In residence for nine days during the tech/dress process until opening at A.D. Players at The George Theatre

in Houston, TX . Mr. Gault served as a resident designer to work alongside industry professionals and directly supervise the A.D. Players interns. Part of the design process months prior to opening, Michael designed several parts of the set, specifically the set dressing. Designing various amounts Christmas decorations mixed with their concept of scrap drives then redesigned to be food and toy drive themed. Michael also gave input and notes that help further the design. Providing draftings and lists weeks leading into tech week, Michael also served as a carpenter/painter to the A.D. Players to develop a series of hands-on exercises that will promote the exploration of traditional scenic technologies used in modern theatrical practices. Bringing together a beautiful world within a wonderful team was something Michael seeked to help accomplish.

THEATRE AND INTERACTIVE STORYTELLING IN "SHARK! AN INTERACTIVE MUSICAL"
Jonas Higbee
Visual and Performing Arts, Oral Presentation
Section: 3, 1:30 PM, Mosaic Multipurpose Room
Presentation Number: 901
Mentor(s): Alison Dobbins

The presentation will talk about the developement process for "Shark! An Interactive Musical", how it draws from previous MSU Department of Theatre reseach into audience interactivity in performance, and how it attempts to use those lessons to create a single coherent story (as opposed to a series of independent activities). At the time of UURAF, only one performance of Shark! will have taken place at MSU. This presentation will discuss how the audience responded to that performance.

SNARES TO WARES GIRAFFE
Richard Tanner
Visual and Performing Arts, Oral Presentation
Section: 3, 1:45 PM, Mosaic Multipurpose Room
Presentation Number: 902
Mentor(s): Laura Cloud

Professor Robert Montgomery in the Department of Fisheries and Wildlife that runs the RECaP lab at MSU (The Research on the Ecology of Carnivores and their Prey) and Tutilo Mudumba, a Ph.D. Student, are researchers working to stop the steep decline of wildlife populations in East Africa through the Snares to Wares Initiative. Snare wires that trap endangered animals are collected from the bush in Uganda and made into toys or works of art that can be sold to support community members in the village of Pakwach, one of the poorest villages in Uganda. They approached Professor Laura Cloud, Sculpture Coordinator, and our sculpture team to share in a collaborative project with the artisans from Uganda. I was asked to weld an armature for a life-sized male Rothschild giraffe, one of the most endangered subspecies of giraffe in Africa with recent estimates suggesting less than 1,600 individuals remaining in the wild. For three months I had the pleasure to work with two Ugandan artists, Mutalib Ngomojik and Sophia Jingo. Together we created the full-scale giraffe, and the piece was mounted on a base weighing 1,800 pounds made from five separate trees that had fallen on campus. The finished sculpture was unveiled on April 20th, 2018 at the Eli and Edythe Broad art museum as part of the Snares to Wares Spring Soiree. MSU's Institute for Quantitative Health Science and Engineering commissioned the giraffe where it is now on permanent display in the IQ building's atrium.

PHASES
Evan Houdek, Taylor Mcphail
Visual and Performing Arts, Oral Presentation
Section: 3, 2:00 PM, Mosaic Multipurpose Room
Presentation Number: 903
Mentor(s): Robert Roznowski

Eight Department of Theatre students recently participated in the Second Annual International Theatre Festival at the American University of Sharjah, UAE. Our cast presented an original piece of theatre, entitled Phases, exploring concepts of personal discovery and finding oneself through the stages of one's past, present, and future self. This piece, along with others provided by multiple American and International Universities were staged on the American University of Sharjah's campus, showcasing the similarities and differences in the process of self-discovery across both international and cultural borders. Throughout this process we gained a generous list of international contacts in our fields, attended special events such as post show banquets and talkbacks, and created scores of new content ranging from original set designs to short plays. Yet the group of us took away more from this journey than simply doing workshops and shows in a new place; we created valuable friendships and priceless memories that will fuel us to continue to create art and delve

deeper into the passion for which we care so deeply for. As a cast we jumped headfirst into a culture that was far removed from our own and have returned with stories and experiences that have left us with a more comprehensive view of life and customs from multiple parts of the globe. Ultimately, after this incredible journey, the world now seems a little bit smaller.

"YOU WILL NOT MAKE LAWS, BUT YOU WILL OBEY THEM?": WOMEN'S ROLES IN POSTCOLONIAL THEATRE
Briana Beeman
Visual and Performing Arts, Oral Presentation
Section: 3, 2:15 PM, Mosaic Multipurpose Room
Presentation Number: 904
Mentor(s): Daniel Smith

This project compares the roles women characters have as feminists, oppressors, and victims in postcolonial and Latin American dramas. Information from genre-specific anthologies of plays and criticism from the 1970s to the early-21st century is utilized to offer a revision of white, male colonial histories. Specifically, the postcolonial plays *The Conversion of Ka'humanu* (Hawai'i), *Anowa* (Ghana), *Inside the Island* (Australia), *The Rez Sisters* (Canada), and *The Demon's Nun* (Mexico) render women as visible, active players in colonial narratives. A comparative aesthetic and thematic analysis of each play demonstrates how the roles of women in these dramas subvert Western character tropes, de-westernize preconceptions of theatre and drama, and enact a more global perspective on gender issues.

A LOOK AT THE CONSERVATION OF PLASTIC-CONTAINING ART
Hadley Griffin
Visual and Performing Arts, Oral Presentation
Section: 3, 2:30 PM, Mosaic Multipurpose Room
Presentation Number: 905
Mentor(s): Phylis Floyd

The purpose of this presentation is to give an overall look at the conservation of plastics, and the techniques used, and also giving three examples of plastic-containing art pieces, and the degradation occured as well as the tecniques used on the pieces.

SOUND THROUGH TECHNOLOGY
Jacob Feldman
Visual and Performing Arts, Oral Presentation
Section: 3, 2:45 PM, Mosaic Multipurpose Room
Presentation Number: 906
Mentor(s): Alexis Bacon

This will discuss the use of sound through a result of audience participation in Shark! the Musical.

DISHING IT OUT: A CULINARY HISTORY OF GENDER POLITICS IN U.S. THEATER
Abigail Byrne, Yaletzy Alaniz, Margo Skornia
Visual and Performing Arts, Oral Presentation
Section: 3, 3:00 PM, Mosaic Multipurpose Room
Presentation Number: 907
Mentor(s): Ann White

This original performance is inspired by historical showbiz cookbooks produced by female theatre professionals during the twentieth century. In two scenes, our performance examines how these artists negotiated women's roles in the industry and society through culinary writing. The first scene explores the boundary between sexuality and domesticity, onstage and off. By comparing dramatic representations of women's sexuality to the carefully-crafted feminine personas in cookbooks (1935-1965), it uncovers the uneasy balance acclaimed women struck between sexual allure and respectability. The second scene takes into account the industry's lack of diversity and representation as it explores how women of color (WOC) theatre artists have displayed their cultural and racial backgrounds through culinary writings versus plays (1960-1999). These glimpses of the gender politics of the theatrical and culinary past illuminate the issues we face in the present both as theatre artists and as women.

Research Mentors

Many thanks to the dedicated research mentors who guided and supported the undergraduate research and creative activities presented today.

Abramovitch, Robert
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Adetayo Olabisi, Michael
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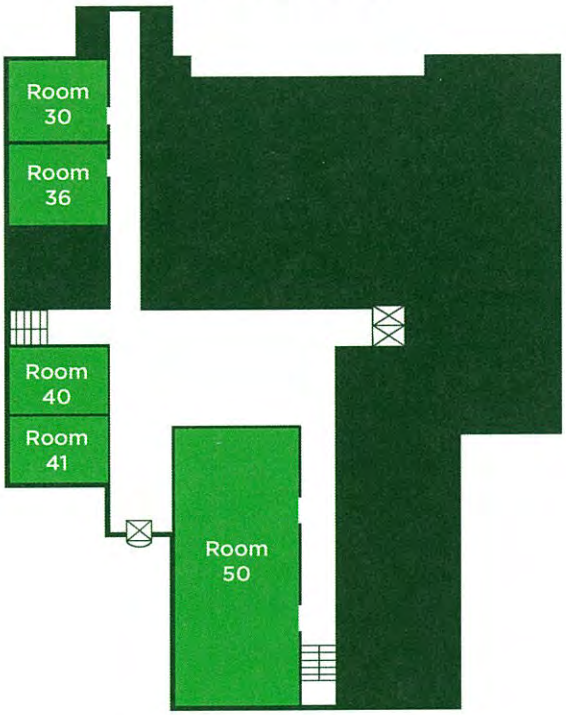

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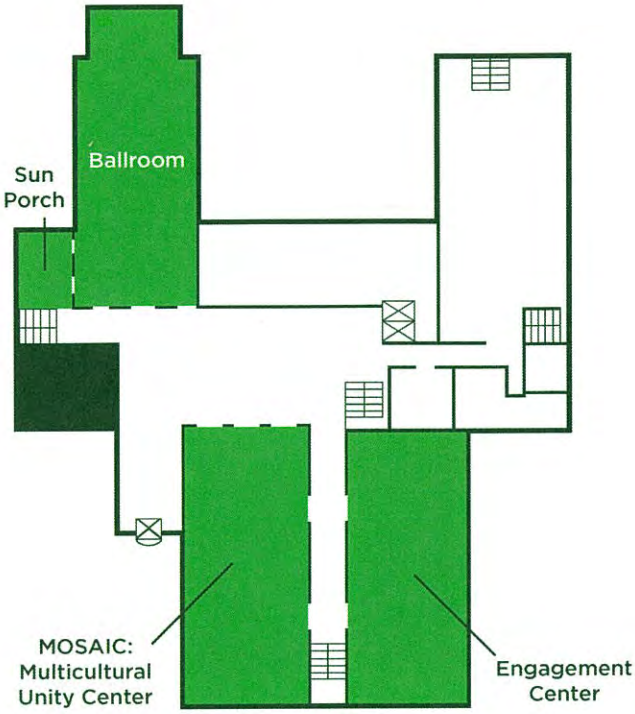

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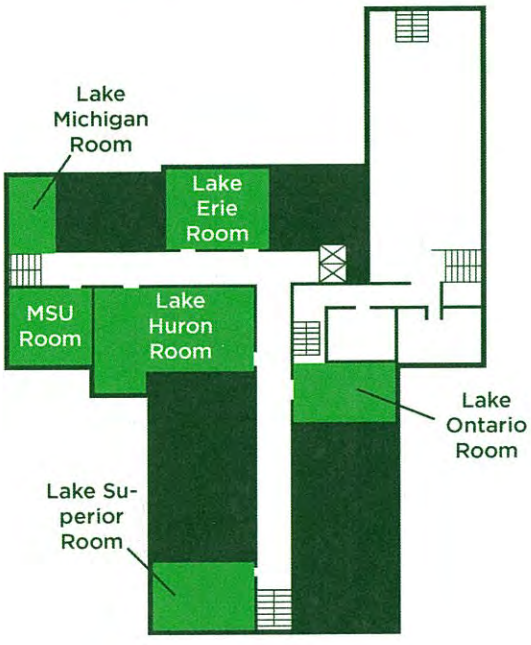

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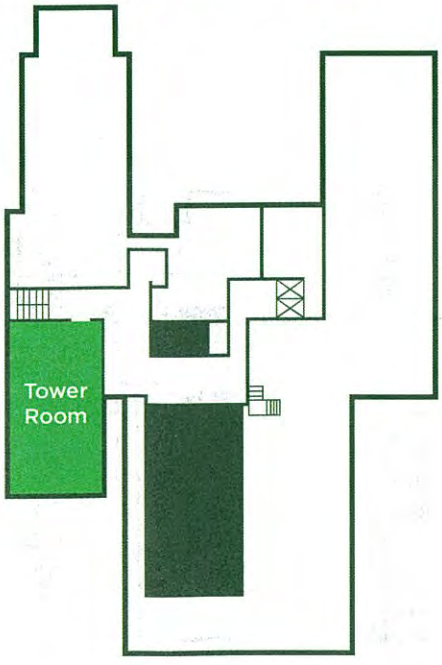

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