University Undergraduate Research & Arts Forum

March 27, 2020

UURAF

ACKNOWLEDGEMENTS

The 22nd annual University Undergraduate Research and Arts Forum (UURAF) at Michigan State University was canceled due to the university's efforts to control the coronavirus outbreak. This program book was created to recognize the outstanding research and creative endeavors by over 960 undergraduate students who registered for UURAF 2020. These students represent 16 different colleges and were mentored by more than 700 faculty, staff, and graduate students.

UURAF is sponsored by the Office of the Associate Provost for Undergraduate Education and the Honors College.

Behind the Scenes

UURAF would not be possible without a team of dedicated individuals in the Undergraduate Research Office who coordinate logistics, respond to inquiries, and support students and faculty. Many thanks to…

- Our undergraduate and graduate staff: Jessica Diaz, Amanda Flores, Christina Igl, Fallyn Richmond, and Faleesia Willis.
- Heather Dover, Coordinator for Undergraduate Research and senior organizer of the forum
- Dr. Korine Wawrzynski, Assistant Dean and Director of Undergraduate Research

We appreciate the work of numerous MSU assistant and associate deans for identifying faculty and graduate students to evaluate student presentations.

Finally, we thank hundreds of dedicated mentors who guided the research projects and creative activities presented in this program book. We encourage you to learn about the impressive work of our next generation of scholars and researchers.

About the Cover

The cover art was designed by Darcy Shank, a 2019 graduate of Graphic Design in the Department of Art, Art History, and Design and member of the Design Center of MSU.

Undergraduate Research Ambassador Program

Our student ambassadors facilitate workshops about undergraduate research, provide guidance on programming and initiatives, and represent the office at campus events. They frequently are invited to present to classes and at student academic organization meetings. The 2019-20 Undergraduate Research Ambassadors include:

Katie Anderson
Melissa Bush
Anna Chinnusamy
Aalayna Green
Daniel Greeson
Abby Jaroszewicz
Jasmine Jordan
Srikar Kessamneni
Mallory Lueck
Kiera McRae
Don Nguyen
Jacqline Njeri
Ali Stark

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Undergraduate Research
MICHIGAN STATE UNIVERSITY

Abstracts

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AGRICULTURE & ANIMAL SCIENCE

EFFECT OF AMMONIA FIBER EXPANSION (AFEX) AS A TREATMENT OF RICE STRAW FOR DAIRY STEERS

Joanna Yiu
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 155
Mentor(s): Brandon Van Soest (ANIMAL SCIENCE), Michael VandeHaar (ANIMAL SCIENCE)

Ammonia fiber expansion (AFEX) is a process intended for use on low-quality crop residue due to its ability to make biomass sugars more accessible. Our objective was to determine whether the AFEX process would increase the available energy of rice straw when fed to young dairy steers. Sixteen Holstein steers were blocked by body weight and randomly assigned one of two diets: AFEX or Control. The Control diet contained 49% chopped untreated rice straw, while the AFEX diet contained the same straw content. Calves were fed once daily and weighed at regular intervals throughout the 7-week study until slaughter, at which point carcass composition and organ measurements were assessed. Digestibility was measured using fecal samples, along with forage and ort samples. Blood samples were taken regularly from the subjects for plasma glucose and insulin levels. After analysis, AFEX was found to increase the available energy of rice straw. This process improved the digestibility of the forage as seen by greater DM and aNDF for total tract digestibility. The AFEX group had higher plasma insulin concentrations, body energy gain, daily body weight gain, and fat content and gain when compared to the Control group. The AFEX process could enable crop residues to be used as cheap feedstuff for use in feeding cattle globally. This would be especially useful in less developed areas that currently burn or dispose of a large amount of their residues.

BOVINE LEUKEMIA VIRUS PVL LINKED TO SINGLE-NUCLEOTIDE POLYMORPHISMS IN THE BOVINE MHC II DRSS3 LOCUS

Cait Ancel
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 156
Mentor(s): Paul Coussens (ANIMAL SCIENCE)

Bovine leukemia virus (BLV) is a delta-retrovirus that causes the most common neoplastic disease in cattle, enzootic bovine leukosis. Infecting 83% of dairy farms in North America, BLV contributes to substantial economic losses. The subclinical progression of BLV has been linked to Bovine leukocyte antigen (BoLA), the major histocompatibility complex within cattle. Previous studies have shown that BoLA-DRβ3 Exon 2 influences the subclinical progression of BLV, as measured by proviral load (PVL) or the amount of virus per unit. Specifically, the DRβ3*1501 allele is linked with susceptibility to high BLV PVL and DRβ3*0902 allele is associated with resistance to BLV or low PVL. We are using bovine DNA samples collected from a previous study to further analyze a linkage between BoLA-DRβ3 Exon 2 alleles, BLV PVL, and immunological phenotypes. Linking BLV PVL with single-nucleotide polymorphisms in the bovine MHC II DRβ3 locus can further validate the association between

particular alleles and disease status, as well as immunological effects of BLV infection. PVL is determined by a commercial SS1 RT-PCR assay. Allele specific primers are being used to detect DRβ3*1501 and DRβ3*0902 alleles by PCR and agarose gel electrophoresis. In addition, we have PCR amplified the entire DRβ3 exon 2 for complete allele analysis by Sanger sequencing in a subset of well-characterized samples.

CONSUMER PERSPECTIVES OF THE MICHIGAN EGG INDUSTRY

Hannah Campbell
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 157
Mentor(s): Dale Rozeboom (ANIMAL SCIENCE), Zachary Williams (ANIMAL SCIENCE)

Consumer opinions and perceptions are some fo the main driving factors that influence consumer purchasing decisions. This study allows poultry industry professionals to make conclusions about why the public prefers certain and products over others. The goal of this is to assist companies in finding methods to improve sales and marketing strategies to increase overall sales, while improving customer relations and satifaction. Specifically this study will gather information on the Michigan egg industry. However, given the diverse culture and characteristics of Michigan's population, poultry companies outside of Michigan's egg industry can reasonalbly use this study to aid in the development of their consumer relations.

POTENTIAL EFFECTS OF HETERODERA GLYCINES POPULATIONS ON SOYBEAN BIOMASS

Hannah Eastman
Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 158
Mentor(s): Haddish Melakeberhan (HORTICULTURE), Isaac Lartey (HORTICULTURE)

Soybean (Glycine max L.) is a multi-value crop contributing over $39 billion to the US economy annually, 80% of this harvest being grown in the Midwestern USA. The benefits associated with soybean production, however, are significantly hindered by a destructive crop pest, the soybean cyst nematode (SCN, Heterodera glycines). SCN is a plant-parasitic nematode that causes yield losses equating to 128 million bushels annually in the USA. Because chemical control is not a sustainable method of treatment, the use of host resistance has become the main strategy in combating the damages inflicted by SCN. Yet due to the rapid adaptability of SCN, new populations are arising that do not respond to resistance-based management. For this reason, broad-spectrum control is not effective. Further, SCN exhibits parasitic variability (PV), meaning that different populations look the same but exhibit diverse behaviors, making effective treatment challenging. The objective of this study is to establish the relationship between soybean biomass yield and SCN parasitic variability using SCN populations from 5 soybean fields in southeast Michigan. A greenhouse experiment testing different inoculated SCN egg concentrations on soybean will be assessed. By establishing a relationship between population variances and soybean yield, SCN populations can be strategically managed. This study will present crucial information on the parasitic behaviors of selected SCN populations and determine their impact on soybean production in the United States. Results will also provide compelling preliminary information with which we may further investigate other soil properties associated with the damage caused by different SCN populations.

INSECTICIDE TREATED MANURE INFLUENCES ON DUNG BEETLE CHOICE AND MANURE REMOVAL

Oren Lerner

Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 159
Mentor(s): Lindsey Kemmerling (INTEGRATIVE BIOLOGY)

Manure decomposition is a critical ecosystem service in agricultural systems for nutrient cycling, creating soil organic matter, and reducing foodborne pathogens. Macroarthropods, such as dung beetles, play an important role decomposing feces by feeding and dispersing for further microbial breakdown. Cows are often fed an insecticide, such as Clarifly, to reduce the number of flies on farms. These insecticides not only kill the larvae of flies in manure, but also the larvae of beneficial decomposers. Dung beetles can prefer different dung based on olfactory cues, which may be altered with the addition of insecticide. Also, landscape management affects dung beetle diversity and abundance. Little research has been directed towards the preference between treated and untreated manure and across agriculture management. We addressed two questions: 1) How does the removal of manure differ across a land-use (organic farming, reduced input farming, no-till farming, conventional farming, successional fields, and deciduous forest)? 2) Do dung associated beetles prefer manure treated with insecticide or without insecticide? Removal of manure was found to be significantly higher in deciduous forest, no-till, and successional treatments ($p = 1.43e-13$). Laboratory results implicate that dung beetles have no significant preference for insecticide-treated manure over untreated ($p > 0.05$). It can be concluded that dung beetles are more abundant with reduced disturbances. Dung beetles show no preference for untreated manure, allowing larvae to be killed unimpededly and impact fitness. This can be applied to farm management to support decomposing macroarthropods by inspiring reduced disturbance and educated input of nutrient-rich manure.

MILK PRODUCTION RESPONSES OF DAIRY COWS TO FATTY ACID SUPPLEMENTS WITH DIFFERENT RATIOS OF PALMITIC AND OLEIC ACID IN LOW- AND HIGH-FAT BASAL DIETS

Maria Kloboves

Agriculture and Animal Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 160
Mentor(s): Adam Lock (ANIMAL SCIENCE), Alycia Burch (ANIMAL SCIENCE)

We evaluated the effects of fatty acid (FA) supplements with different ratios of Palmitic (C16:0) and Oleic (C18:1) acids in low and high fat basal diets on production responses of dairy cows. Thirty-six multiparous Holstein cows were used in a split-plot Latin square design. Cows were blocked by milk yield and allocated to a main plot receiving either: low fat (LF) basal diet (n=18) consisting of cottonseed meal and cottonseed hulls or high fat (HF) basal diet (n=18) consisting of whole cottonseed. Within each plot a 3x3 Latin square arrangement of treatments was used with three 21-day periods. Treatments included: 1) control (CON; no FA supplementation), 2) FA supplement containing 80% C16:0 + 10% C18:1 (PA), and 3) FA supplement containing 60% C16:0 + 30% C18:1 (PAOA). FA supplements were fed at 1.5% DM. Treatment by basal diet interactions were observed with FA treatments increasing lactose yield and tended to increase milk yield in LF but not in HF. Basal diet had no effect on DMI or milk yield. Compared with LF, HF increased 3.5% FCM and milk fat yield and tended to increase ECM. PAOA decreased DMI. FA treatments increased 3.5% FCM, ECM, and milk fat yield compared with CON but there was no difference between FA treatments. In conclusion, a high fat basal diet had positive production responses while the addition of fat supplements increased milk fat yield, 3.5% FCM, and ECM regardless of basal diet.

THE ROLE OF THE TH17 IMMUNE RESPONSE IN JOHNE'S DISEASE TO ENHANCE ITS USE AS A MODEL FOR CROHN'S DISEASE

Hannah Cooperider, Noah Lubben
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 323
Mentor(s): Paul Coussens (ANIMAL SCIENCE)

Johne's disease (JD) is a gastrointestinal disease in ruminants caused by Mycobacterium avium subspecies paratuberculosis (MAP). JD is characterized by a long subclinical stage of infection in cattle. MAP infection subsequently results in clinical symptoms of diarrhea and chronic wasting. In many ways, the macroscopic and microscopic pathology of JD is similar to that of human Crohn's Disease (CD). MAP has thus been suggested as a cause or exacerbating agent in some cases of CD. However, this connection is not well understood nor universally accepted. The Th-17 immune response is a proinflammatory host defense against pathogens, including MAP in cattle. Our laboratory has shown that Th17 cell activity, which is promoted by two cytokines, IL-23 and IL-17a, plays a key role in inflammatory immune responses to MAP. We have proposed that the continued presence of IL-23 from MAP infected cells may lead to unregulated inflammatory activity. Importantly, there is also an association of between the Th-17 pathway and CD in humans. In fact, anti-IL-17a and anti-IL-23 therapies are used to treat some cases of CD. Thus, JD offers a promising model for human CD Th17 immune responses. To this end, our laboratory created a JD lesion grading system for MAP infected ileal tissues and has many of these tissues preserved. We are currently using western blot analysis to assess the relative abundance of Th17 associated cytokines in some of these tissues. It is hypothesized that the expression of IL-17a will decrease, while IL-23 will increase, as JD lesion severity progresses.

FATTY ACID COMPOSITION DIFFERENCES BETWEEN PASTURE AND TRADITIONAL GRAIN DIET

Travis Goeden
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 324
Mentor(s): Jenifer Fenton (FOOD SCIENCE & HUMAN NUTRITION)

The composition of feed fatty acids (FA) has the potential to modulate the FA profile of ruminant meat quality. The objective of this study was to compare the FA profile of a pasture diet (mixed alfalfa, orchard grass, red & white clover, trefoil, chicory, fescue, timothy, dandelion), as compared to a traditional grain diet (hay, dry and high moisture corn and vitamin and mineral supplement). Pasture samples (n=55) and grain (n=10) were freeze dried, ground and FAs were extracted using microwave assisted technology. Fatty acid methyl esters (FAME) were generated using a two-step methylation consisting of 0.5 N sodium methoxide and 5% methanolic HCl. The FA composition was quantified using gas-chromatography coupled mass-spectrometry. Pasture samples had a significantly higher amount of omega-3 (n-3) FA compared to grain (0.39 vs. 0.07 $P < 0.001$). Pasture had significantly lower total omega-six (n-6) FA compared to grain (0.08 vs. 0.79 $P < 0.001$). Additionally, pasture had lower n-6 to n-3 ratio (0.22 vs. 12.02 $P < 0.001$). Pasture grasses were significantly lower in saturated fatty acids (0.11 vs. 0.25 $P < 0.001$) and in monounsaturated fatty acids compared to grain (0.03 vs. 0.11 $P < 0.001$). These differences have important implications for biohydrogenation products produced by ruminant animals which have consequences for nutritional value of meat.

CARBON SOURCE DETERMINES DENITRIFICATION RATES WITHIN SOIL COMMUNITIES

Kristin Fuller

Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 325
Mentor(s): Andrew Curtright (PLANT, SOIL, AND MICROBIAL SCIENCES), Lisa Tiemann (PLANT, SOIL, AND MICROBIAL SCIENCES)

As a process that transforms nitrogen in the soil into atmospheric nitrogen gas (N2), denitrification affects agricultural systems. When plants experience N limitation, crop yield and quality may diminish as a result. It is important to see how different sources of carbon play a role in denitrification, as they act as an energy source in this anaerobic respiratory process. In this regard, the effects of various C sources on soil microbial communities with respect to denitrification potential has not been well quantified. We hypothesized that monomeric C sources may stimulate more denitrification than polymeric C, since polymers must first be broken down into monomers before being utilized. We established 12 different C treatments to determine how denitrification rates would be affected by different sources. We also utilized soils from various sites to see how C preference differed among select soil types. A standard denitrification potential assay was used to gather the data. No significant difference in denitrification rate was found between monomeric and polymeric C sources. There were however significant differences in denitrification produced between the different C sources on their own. Results also varied with each type of soil. Overall, the data gathered indicate that not all C sources produce the same amount or rate of denitrification.

VESSEL TRAFFIC IMPACT ON HUMPBACK WHALE BEHAVIOR

Grace Gargiulo

Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 326
Mentor(s): Amber Peters (FISHERIES & WILDLIFE)

The research focused on observing vessel traffic impact on humpback whale behavior. Humpback whales migrate back and forth from their breeding and feeding grounds each year, and this migratory pattern is often disturbed by human intervention. The importance of this study lies in preservation of natural behaviors and decreasing stress on whale populations. Data points, including whale and boat location coordinates and observed behaviors, were collected during three different time periods: before the whales came into contact with a vessel, during an interaction between a boat within a half mile from the whales and the whale pod, and for a time after the boat had left the whale's vicinity. Surface active and dive behaviors were recorded and calculated for each boat period, then compared against each other. The term surface active was used to describe any behavior that the pod exhibited at the air water interface which indicated their activity level. These displays included a fluke up or fluke down, pectoral slap, head lunge, and several more. Dive behavior was categorized as any time the pod would submerge and not be seen performing a surface active behavior, milling, or blowing. This data was compiled and used to determine vessel traffic and human impact on whale behavior. Discovering the long term effects of noise pollution and stress, the result of boats, on cetaceans is an ongoing research project.

RELATIVE EXPRESSION OF ISG15 IN PERIPHERAL BLOOD LEUCOCYTES OF DAIRY HEIFERS VS. HEIFERS TREATED WITH HALF A DOSE OF CLOPROSTENOL SODIUM 3 DAYS AFTER AI

Renee Harbowy, Shayla Bajric

Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM

Presentation Number: 327
Mentor(s): Alisson Da Mota Santos (ANIMAL SCIENCE), James Pursley (ANIMAL SCIENCE), Jason Knott (ANIMAL SCIENCE), Nathalie Trottier (ANIMAL SCIENCE)

Circulating levels of progesterone from day 10 to 18 post-AI may be a key limiting factor in embryonic elongation and potential pregnancy. The aim of this study was to determine the effects of reduced progesterone levels by half a dose of cloprostenol sodium (PGF2a) on day 3 of the estrous cycle following AI on relative expression of interferon stimulated gene - 15 (ISG15) in Holstein heifers. Nulliparous heifers (n=22) were monitored twice a day with the SCR Heatime® Pro+ System for the onset of estrus and received AI within 16 hours after detected estrus. Heifers were randomly assigned into two groups: control (no treatment; High progesterone) or treatment with 0.250 mg cloprostenol sodium (1/2 dose) 3 days after estrus (Low progesterone). Ovulation was confirmed by ultrasound examination of the ovaries on the day of and 24 hours after the onset of estrus. Relative expression of ISG15 was estimated by real time reverse transcriptase polymerase chain reaction (RT-PCR) from whole blood samples collected on day 4 of the estrous cycle and day 18 post-AI. Serum levels of progesterone were assayed on days 18, 19, and 20 of the estrous cycle. Results will be presented upon completion.

DEVELOPING A PESTICIDE RISK ASSESSMENT APP FOR GRAPE PRODUCERS

Brittney Emmert
Agriculture and Animal Science, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 328
Mentor(s): Cara Robison (ANIMAL SCIENCE), Karen Chou (ANIMAL SCIENCE)

In Michigan, there are 8.4 million grape vines growing on 13,000 acres. Grapes are susceptible to certain diseases, and producers will use pesticides to ward against potential disease. To avoid disease resistance to pesticides and decrease exposure risk to workers and consumers, producers need easy access to practical information regarding risk, toxicity, and efficacy of pesticides. This project sought to create a user-friendly system that contains the necessary information for producers to make educated choices on pesticide use. Data on toxicity, efficacy, and risk was collected from the Environmental Protection Agency for 66 pesticides used to control powdery mildew, downy mildew, or grape berry moth. Depending on the information available, up to 400 variables for each pesticide was entered into a relational database software (FileMaker, Apple Inc.). Internally created algorithms used the collected data to determine an aggregate risk value for both workers and consumers for each pesticide. FileMaker has the ability to convert into a touchscreen app and was used to create a user interface that displays the efficacy and aggregate risk values. The pesticides can be ranked according to their efficacy against a disease or by their risk value. In addition, producers can create their own user log in the FileMaker app to track the pesticide use on their blocks and aid in making future decisions. The FileMaker user interface allows producers access to risk assessment data in a form that is usable for making informed decisions to reduce disease resistance and exposure risk to workers and consumers.

MODIFICATION OF THE MEET YOUR MATCH FELINE-ALITY ASSESSMENT FOR GROUP HOUSED SHELTER CATS: IS IT RELIABLE AND PREDICTIVE OF IN-HOME FELINE BEHAVIOR?

Shaelynn Goedtel
Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 509
Mentor(s): Jacquelyn Jacobs (ANIMAL SCIENCE)

Developing shelter behavior assessments that accurately describe cat personality and predict behavior in the home would help many prospective owners find the right cat. To address this issue, the Meet Your Match (MYM) Feline-ality uses a series of behavior assessments to assign each cat to one of nine personality types, and previous research has validated its ability to predict in-home behavior. However, this assessment was designed for cats in solitary kennels while shelter group-housing is common. To expand its application, a MYM test for group-housed cats must be created. Our objectives were to 1) develop a reliable group-housed assessment, and 2) compare its ability to predict in-home behavior with the original MYM. Development of the modified assessment involved changes to four of the 11-point item assessment. Ten group-housed cats were individually tested using the modified assessment and re-tested 2-days later. Upon retest, 8/10 cats were assigned identical personalities, while the other two were within a 10% and 17% range of their first score, respectively. Assessments were then performed on all adoptable cats and owners were provided a survey to complete 2-weeks post-adoption. Data collection is ongoing. To date, 26 group-housed cats and 39 solitary cats have been assessed. Survey response rate is currently 20% (13/65). The original MYM is more predictive of in-home behavior (57% (4/7)) than the modified (14% (1/6)), suggesting that both require further adjustments. Exploration of the individual items in the assessments will be performed to determine which are most predictive of behavior in the home.

DO MICRONUTRIENTS LIMIT FREE-LIVING NITROGEN FIXATION IN THE SWITCHGRASS RHIZOSPHERE?

Darla Knuth

Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 510
Mentor(s): Lisa Tiemann (PLANT, SOIL, AND MICROBIAL SCIENCES)

Switchgrass is a bioenergy crop that can be a carbon-neutral energy source, provided it does not require nitrogen fertilization. In order to know whether switchgrass can be successfully grown without fertilization, we must better understand the controls on free-living N-fixation that can occur in the switchgrass rhizosphere. The purpose of this experiment was to observe the effects of phosphorus (P), Vanadium (V), iron (Fe), and molybdenum (Mo) availability on N-fixation potential in the switchgrass rhizosphere. P is known to be an important part of energy production and has shown to be a limiting factor in N-fixation. V, Fe, and Mo on the other hand are co-factors of different forms of the nitrogenase enzyme, which is responsible for N-fixation. Thus, these micronutrients have the potential to limit N-fixation. We grew switchgrass from seed in the greenhouse in field soils collected from two switchgrass cropping system experiments in Michigan and added either no nutrients or each of the nutrients separately. The switchgrass was harvested after 10 weeks and we measured rates of N-fixation via 15N tracing, inorganic N (soil ammonium and nitrate), total plant biomass, plant tissue N concentrations and microbial biomass N. Total microbial biomass increased with nutrient additions, while Fe addition resulted in decreased ammonium and increases nitrate. We expect to see higher N-fixation rates in soils with nutrient additions and rates to be highest with Mo (most common nitrogenase co-factor) compared to other nutrient additions.

OPTIMIZATION OF BAG-IN-BOX TECHNOLOGY FOR CUCUMBER FERMENTATION

Lauren Kaltz

Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 511
Mentor(s): Steven Safferman (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Younsuk Dong (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Food loss refers to the amount of available, edible food that is not consumed and enters the waste stream. According to the USDA, 31% of available food in the United States ends up as waste. Preserving this food would not only minimize environmental impacts, but also increase profitability. In previous studies, it has been shown that bag-in-box technology for brining cucumbers is an effective method of food preservation, as it enables a low salt process that allows the brine from fermentation to be reused in the finished product. This also reduces washing, which prevents the production of high salt wastewater. The purpose of this research is to investigate the bag-in-bog technology as a way to preserve food at an industrial scale for growers, processing facilities, and retailers. The design of this system replaces the blanching and cooling steps with a nitrogen purging system that creates anoxic conditions to discourage the growth of unwanted microbes and remove carbon dioxide formed during fermentation. In current experiments, carbon dioxide is being pumped into the bag-in-box system as a way to stimulate the carbon dioxide formed during fermentation. This allows for determining the optimal flow rate of nitrogen for the purging process.

IMPLICATIONS OF CLAW REMOVAL ON STONE CRAB (MENIPPE MERCENARIA) FITNESS

Olivia Boeberitz

Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 512
Mentor(s): Alex Walus (BIOLOGICAL SCIENCE PROGRAM)

Stone crabs (Menippe mercenaria) are valued predators that primarily occur off the coasts of North Carolina, Florida and in the Caribbean and Gulf of Mexico. Although majority of landings are made in Florida, USA, the fishery is emerging in The Bahamas with an export value of $2.8 million annually. Stone crabs are essential to the coastal ecosystem due to their ability to maintain benthic populations and larval contributions to prey higher up on the food chain. The stone crab fishery mandates the practice of claw removal, rather than harvesting the entire organism. Although it is best practice to take one claw, it is currently lawful to remove both. Presumably, the impact of claw-only fisheries on a population is lesser than traditional practices due to the ability of stone crabs to persist without their claws and their ability to regenerate appendages. Using laboratory simulated trials, this study examined short term consequences of removing one and two claws. Individual crabs were observed in the same tank as a predator, the caribbean reef octopus (Octopus briareus) or juvenile nurse shark (Ginglymostoma cirratum), with varying numbers of claws. Results suggest that claw-only fishery practices are not renewing the population and have potential negative implications on survival. Juvenile nurse sharks exhibited no interest in crabs with both claws, but immediately following the first claw removal, attacked and killed the stone crab. This behavior supports low recapture estimates of crabs with harvested claws, indicating post-release mortality due to predation effects.

SILICON EFFECT ON WOODY BREAST DEVELOPMENT IN CHICKENS

Tristin Nguyen

Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 513
Mentor(s): Zachary Williams (ANIMAL SCIENCE)

This research project is on the effect of a silicon additive via water on the development of woody breast in broiler chickens. The woody breast condition causes the breast meat to become tough, develop a paler color, and have poor quality texture—often making these breasts unusable by sellers. Silicone added to their water has potential to increase their bone strength to reduce the risk of breaking. This allows for better welfare of the chickens and a decrease in mortality. Three different treatments were used: a control, a normal, and a high

group. The chickens that were tested were raised for seven weeks and then euthanized, processed, and the meat then frozen. The meat was then thawed, right side of the pectoralis major was removed cooked to 71 C, core samples were taken and analyzed using the Warner-Bratzler method to test the tensile strength. I will present the data collected from these tests—to show the difference in the force profiles of each treatment group. Providing a conclusion about silicon additive effect on woody breast development.

VEGANS TURNED FLESH-EATERS: ALTERED MACRONUTRIENT RATIOS PROMOTE CANNIBALISTIC BEHAVIOR IN A GENERALIST HERBIVORE (TRICHOPLUSIA NI)

Brendan Randall

Agriculture and Animal Science, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 514
Mentor(s): Elizeth Cinto Mejia (ENTOMOLOGY), Kayleigh Hauri (ENTOMOLOGY), William Wetzel (ENTOMOLOGY)

Insect pests present one of the largest problems to crop and pest management strategies in agricultural systems. An effective method of reducing insect herbivory is by introducing natural predation as a means of biocontrol and sustainable pest management. Studies have shown that plant chemical defenses can reduce crop damage by promoting cannibalistic behavior in herbivores, leading to less plant tissue consumed and fewer herbivores surviving and reproducing. We performed experiments on artificial noctuid diet to investigate the role macronutrients and chemical plant defense has on cannibalism rates of a generalist herbivore (Trichoplusia ni). Our results suggest that varying macronutrient ratios and plant defenses promote cannibalistic behavior in a generalist herbivore. This highlights one potential way that plant defenses can contribute to the regulation of insect herbivore populations.

RETROSPECTIVE ANALYSIS OF EXTENDED COPPER OXIDE WIRE PARTICLE TREATMENTS ON STRONGYLE FECAL EGG COUNTS IN CAPTIVE HIPPOTRAGINAE

Avery Tilley

Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 695
Mentor(s): Holly Haefele (EXTERNAL MENTOR)

Gastrointestinal nematodes (GIN) are becoming a serious issue in zoological institutions, presenting severe clinical implications associated with high morbidity, and even mortality in exotic artiodactylids. The life cycle and ecology of GIN present several specific challenges in their mitigation including developing anthelmintic resistance, reinfection in high-density captive herds, the implementation of arrested larval development, and recent shifts in climate producing warmer and wetter conditions. In order to mitigate these issues and prevent anthelmintic resistance, institutions have begun to turn to other alternative forms of GIN control including Copper oxide wire particles (COWP), a small bolus, or a feed additive, containing only Copper, eventually ingested where Copper is then slowly released. This study investigated the impacts of COWP on fecal egg counts (FEC) to quantify long-term effectiveness of COWP as a treatment for GIN in exotic artiodactylids, specifically Gemsbok antelope (Oryx gazella) and Sable antelope (Hippotragus niger) of the Hippotraginae subfamily. Two years of FEC data was analyzed from sorta-situ individuals (n=47) at Fossil Rim Wildlife Center, treated monthly with COWP in a top-dressing application dosed at 25mg/kg. It was determined that COWP decreased FEC in both Sable and Gemsbok by a fecal egg count reduction ratio of 42%; mean pre-treatment FEC was 1086.16 egs/g, while mean post-treatment FEC was 554.16 eggs/g. For such reasons, COWP do make an important

addition to parasitic control methods, however they should not serve as the only treatment option and should be evaluated in other exotic artiodactylids.

TRACKING THE IMPACT OF WEATHER ON EQUINE PHYSICAL ACTIVITY

Gretel Keller

Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 696
Mentor(s): Fernando Vergarahernandez (ANIMAL SCIENCE), Brian Nielsen (ANIMAL SCIENCE), Cara Robison (ANIMAL SCIENCE)

Housing horses on pasture holds numerous advantages over housing in stalls, promoting both better mental and physical equine health. The most significant reason for these benefits is the potential for increased physical activity in horses on pasture versus those confined to stalls. Such activity promotes better overall health. However, these results are contingent on the horse's willingness to engage in the greater physical activity that being on pasture provides. For this reason, it is important to understand the various reasons why horse activity patterns change. The objective of this project was to investigate how various weather factors - including temperature, humidity, precipitation, and wind speed - impact the activity patterns of horses. To achieve this, horses were equipped with activity monitoring devices, which resembled large watches strapped to the hind leg, during five independent weeks from January to August. Number of steps, standing time, lying down time, and lying bouts were all variables tracked by the device. The movement data were then compared to the corresponding weather conditions. This project investigates the impact of weather on the horses' movement. Potential explanations for the findings are given, including other factors that may have influenced the horses' activity. It is anticipated similar research on other environmental factors will be necessary in future to determine additional influences on pasture activity and ultimately the best management practices for equine health.

IDENTIFICATION OF BOLA ALLELES ASSOCIATED WITH BLV PROVIRUS LEVELS

Ciarra Lahuis

Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 697
Mentor(s): Tasia Taxis (ANIMAL SCIENCE)

Cattle in the US are greatly affected by bovine leukosis - a disease caused by bovine leukemia virus (BLV). Since the 1960s, BLV prevalence has risen from 10% to 50% of cattle in US and Canadian herds affected. This virus infects primarily B cells, integrates itself into the host's DNA, then replicates via mitosis, causing a lifelong infection. Preliminary data suggests that a contributor to the amount of BLV present in one animal is the bovine leukosis antigen (BoLA) haplotype, which is involved with antigen presentation. This project aims to understand the affects that the various BoLA haplotypes has on the amount of BLV present in individual beef cattle. Female beef cattle from 27 cow/calf herds in the Upper Midwest Michigan were tested for BLV antibodies via ELISA. The samples that were found to be ELISA positive and contain a varying level of provirus (n=190) will be sequenced to determine variations in BoLA haplotype. This dataset will be compiled with data from a preliminary study to identify associations between longevity and the sequenced haplotype. Results from this study will help to provide valuable information in the progress to eradicate BLV in the United States.

EQUINE BETA DEFENSINS IN SYNOVIAL FLUID

Brooke Boger

Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM

Presentation Number: 698
Mentor(s): Jane Manfredi (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

Bacterial infection of a joint, known as septic arthritis, is a devastating disease that affects horses of all ages. Diagnosis is not straightforward but is based subjectively on a combination of clinical signs, cytologic analysis of synovial fluid, and positive synovial fluid culture. Even with timely diagnosis, treatment is expensive and difficult. There is a critical need to identify biomarkers that could provide earlier diagnosis of septic arthritis in horses. The objective of this study is to identify biomarkers in equine synovial fluid that are specifically present in early cases of equine septic arthritis to facilitate a faster and more accurate diagnosis. This will be accomplished by comparing protein expression of beta defensins within synovial fluid from normal joints, those with aseptic inflammation, and joints with septic inflammation. Our hypothesis is that equine beta defensins are present and released by stimulated equine neutrophils into synovial fluid in cases of equine septic arthritis and that at least one of these biomarkers can be used for earlier and more accurate diagnosis of septic arthritis in horses. Equine synovial fluid will be collected from 6 healthy horses. ELISAs to identify gene and protein expression of equine beta defensins will be performed on synovial fluid from normal horses, as well as horses with osteo- and septic arthritis. The identification of increased expression of beta defensins as an early biomarker in cases of septic arthritis would lead to more timely and accurate diagnosis, leading to the initiation of appropriate treatment and improved outcomes.

IMPACT OF DELAY IN WATER SAMPLE FILTERING ON DISSOLVED REACTIVE PHOSPHOROUS CONCENTRATION AND LOAD

Alex Seybold
Agriculture and Animal Science, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 699
Mentor(s): Ehsan Ghane (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Subsurface drainage is used to remove excess water from farm fields, which can contain nutrients like phosphorous and nitrogen. Certain Edge-of-Field agricultural research seeks to minimize the amount of nutrients lost from the field by monitoring nutrient concentrations and flow rate in drainage. Dissolved reactive phosphorous is a form of phosphorous that is readily available to organisms and can cause algal blooms in fresh bodies of water. Sampling of dissolved reactive phosphorous (DRP) is necessary to determine the amount of phosphorous that is lost from the field through subsurface drainage. The objective is to determine whether the amount of time between collection and filtering of samples from the field affects the concentration and daily load of dissolved reactive phosphorous. The samples were collected from four fields in the River Raisin watershed in Michigan. A filtered sample and unfiltered sample are taken from the bottle immediately. The unfiltered sample is filtered after one day to represent the one-day sample. After one week another sample is taken from the bottle and filtered to represent the seven-day sample. After two weeks the last sample is taken from the bottle and filtered for the fourteen-day sample. Statistical analysis of the data will be used to determine if there is a significant difference between DRP concentration and load that is immediately filtered compared with those that are filtered with a delay. We expect that the amount of time between collection and filtering of field samples will affect the dissolved reactive phosphorous concentration and load significantly.

UTILIZING 3-DIMENSIONAL MODELS TO ASSESS KEEL BONE DAMAGE IN LAYING HENS

Brittney Emmert
Agriculture and Animal Science, Oral Presentation
Section: 5, 1:30 PM
Presentation Number: 823
Mentor(s): Cara Robison (ANIMAL SCIENCE)

Currently, 20% of the 340 million laying hens are in aviary systems, and this is projected to increase as consumer demand for cage-free eggs rises. Cage-free systems have an increased incidence of keel bone damage, which may result in a decrease in egg production and well-being by causing pain and possibly reduce their ability to effectively navigate their environment. The objective of this study was to determine if dietary supplements of omega-3 fatty acids or vitamin D would decrease keel damage in hens housed in a multi-tier aviary system (AV). Lohmann brown birds received dietary treatments of basal, flaxseed oil, fish oil, and 25-hydroxy Vitamin D3 beginning at 12 wks of age with one treatment per room. A total of 2304 hens were placed in AV system after rearing at 17 wks. For each treatment, 36 focal birds were chosen and tagged. At each time point, birds were placed in restraint-limiting devices and computed tomography (CT) scanned. Mimics software (Materialise, Plymouth, MI, USA) was used to create 3-dimensional models of the keels from the CT scans. The keel models from each time point were visually assessed for damage in MeshLab (Open Source software). For each keel, the location, direction, type, and severity of each individual deviation or fracture, as well as a severity score for the keel overall, was recorded. Results will be determined by date of presentation and will quantify the amount of damage present at each time point, the location of the damage, and severity changes over time.

THE IMPACTS OF INCORPORATING SPRINT EXERCISE ON CALF STARTER CONSUMPTION AND PLAY BEHAVIORS

Sarah Prohaszka
Agriculture and Animal Science, Oral Presentation
Section: 5, 1:45 PM
Presentation Number: 824
Mentor(s): Alyssa Logan (ANIMAL SCIENCE), Brian Nielsen (ANIMAL SCIENCE), Cara Robison (ANIMAL SCIENCE)

Previous research has shown dairy calves often face reduced consumption of feed after weaning, which negatively impacts growth. It has also been determined when calves exhibit play behaviors energy intake can be impacted. In this study, calves performed short sprints to determine if calf starter consumption and play behaviors would be impacted. Twenty-four Holstein bull calves were randomly assigned to treatments of 1, 3, or 5 d/wk of sprint exercise, with a control group sprinting 0 d/wk. During the 6-wk study, calves were housed at the MSU Beef Cattle Teaching and Research Center in stalls allowing them to stand, lay down, and turn around. Calves sprinted individually down a 71-m concrete aisle according to their prescribed treatment. Once each week, sprints were videotaped and the presence of jumping or bucking was recorded. Feed consumed by the calves was weighed each morning, if 0.5kg or less remained, their ration was increased by 0.5kg. In terms of feed consumed, there was no treatment effect ($P = 0.097$), there was a difference between weeks ($P < 0.0001$), and a treatment by week interaction ($P = 0.0196$) with each treatment consuming more feed each week. No significant differences were found in the frequency of calves jumping or bucking between treatment groups ($P = 0.90$) or weeks ($P = 0.79$). In this study short sprints did not alter feed consumption; longer durations of exercise would be expected to increase feed consumption. Further research on calf management could determine stimulating activities which allow natural play behavior.

COMPARING SOIL-WATER CHARACTERISTIC CURVE VALUES TO EMPIRICAL EQUATIONS IN DETERMINING MOISTURE TENSION, DRAINABLE POROSITY, AND SOIL CONDUCTIVITY

Alex Seybold

Agriculture and Animal Science, Oral Presentation
Section: 5, 2:00 PM
Presentation Number: 825
Mentor(s): Ehsan Ghane (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Soil-water characteristics show the water capacity of soil, which helps to understand the amount of water uptake for a field of crops. The soil-water characteristic curve for a soil defines the relationship between water content and soil suction. This method requires soil collection from different depths in a given crop field. Since soil collection requires a fair amount of resources, research groups have turned to empirical equations. The empirical equations are based on regression analysis of large data sets. The equations require various soil properties that can be measured or estimated easily. The three characteristics focused on by the research are moisture tension, drainable porosity, and soil conductivity. Moisture tension shows the amount of work required to move water through a soil. Drainable porosity depends on the level of the water table and the amount of water captured by a soil. Soil conductivity refers to the effect of soil texture on movement of electrons in a soil. These characteristics determine water movement in a field and can predict crop productivity and irrigation technique. If the empirical equations are found to be a good representation of soil characteristics by comparing to soil-water characteristic curve values, this new method would be more efficient. Research is ongoing in this area.

COMPARING TOTAL PHENOLIC COMPOUNDS IN COMPLEX PASTURE VS CONVENTIONAL FEED FOR BEEF CATTLE

Humza Ali

Agriculture and Animal Science, Oral Presentation
Section: 5, 2:15 PM
Presentation Number: 826
Mentor(s): Jenifer Fenton (FOOD SCIENCE & HUMAN NUTRITION)

Grass-finished beef is generally considered healthier than grain finished beef in part because the omega-6/omega-3 ratio is reported to be lower. However, complex pasture mixtures are also purported to contain higher concentrations of plant secondary metabolites; the consumption of which is thought to be important for human health. The objective of this study was to compare the total phenolic compounds, carotenoids and chlorophyll in complex pasture vs conventional feed. Complex pasture containing a mixture of alfalfa, orchard grass, red and white clover, trefoil, chicory, fescue, timothy, and dandelion (n=22) compared to a mixture containing a mixture of 18% hay, dry and high moisture corn, and pellet (n=23). Total carotenoid concentration, chlorophyll A and B, total phenolic compound, and total phenolic acid were measured using previously described spectrophotometric methodology. Total carotenoid concentration was significantly higher in pasture samples vs grain (3.05±35 vs 0.77±.0.03; $p<0.0001$). Chlorophyll A concentration was significantly higher in pasture samples vs grain (0.78±0.06 vs 0.16±0.01; $p<0.0001$). Chlorophyll B concentration was significantly higher in pasture samples vs grain (1.90 ±0.39 vs 0.79±0.03; $p=0.022$). Total phenolic compound concentration was significantly higher in pasture samples vs grain (4.57±0.26 vs 2.91±0.17; $p<0.001$). Total phenolic acid concentration was significantly lower in pasture samples vs grain (0.49±0.01 vs 0.62±0.03; $p<0.001$). In conclusion, total phenolic compounds, chlorophyll and carotenoids, are significantly higher in complex pastures compared to conventional feed. Complex pasture consumption by cattle may lead to accumulation of higher concentrations of plant secondary metabolites in beef.

EVALUATION OF ACCURACY OF THE ON-FARM REAL-TIME PCR SYSTEM ACUMEN DETECTION FOR THE DETECTION FOR THE CONTAGIOUS AND ENVIRONMENTAL PATHOGENS

Amanda Babiak
Agriculture and Animal Science, Oral Presentation
Section: 5, 2:30 PM
Presentation Number: 827
Mentor(s): Pamela Ruegg (ANIMAL SCIENCE)

Mastitis is the most common bacterial disease of dairy cows and it the most common reason that antibiotics are administered. It is critical for farmers to determine if animals are infected with contagious or environmental mastitis pathogens in order to make appropriate management decisions. The standard method for identifying pathogens is traditional microbiological culture of milk from affected glands, which can be time consuming. PCR testing is used in commercial laboratories to more rapidly identify mastitis pathogens and recently on-farm PCR system (Acumen) that can identify four common mastitis pathogens (Staph aureus, Strep uberis, Prototheca spp., and Mycoplasma spp.). The objective of this study was to determine agreement between the on-farm PCR system, microbiological culture. Composite milk samples (n=105) were collected from either milk meters (n=50) or directly from udders of cows (n=55). All samples were cultured on blood agar, MacConkey, Mycoplasma, and Prototheca Isolation Media (PIM)and further tested using Acumen Detection systems. Of total samples evaluated (n=105+), the Acumen test was positive for Mycoplasma spp (n=13), Streptococcus uberis (n=12), and Staphylococcus aureus (n=2). No samples were positive for Prototheca (n=0). The positive samples were sent to Central Star DHIA lab for further PCR testing. Agreement between results of on-farm PCR analysis and conventional microbiological testing of bovine milk samples will be reported.

HEAT TREATMENT AND ITS EFFECT ON THE POTENCY OF ALEUTIAN DISEASE VIRUS IN MINK

Maddy Sokacz
Agriculture and Animal Science, Oral Presentation
Section: 5, 2:45 PM
Presentation Number: 828
Mentor(s): Tasia Taxis (ANIMAL SCIENCE)

Aleutian disease virus (ADV) is a parvovirus that infects and kills farm-raised mink, adding to the industry's economic decline. Eradicating ADV from farms remains a constant struggle due to the lack of information and understanding of the virus. This project aimed to determine the optimal temperature to heat ADV for inactivation. Eighteen ADV-free mink were purchased from a local farm. Four treatment groups were injected with isolated ADV that had undergone one of the following heat treatments: 70°C for one hour, 70°C for two hours, 80°C for one hour, or 80°C for two hours. Positive and negative control groups were also included. Mink were weighed weekly. Blood samples were collected one day prior to and 28 days post injection. Necropsy was performed 28 days post injection, with spleen, liver, and mesenteric lymph nodes extracted for later analysis. Blood was analyzed for the presence of ADV by end-point PCR. Regardless of heating time, all mink challenged with the 70°C-treated virus were infected with ADV while all animals challenged with the 80°C-treated virus tested negative for ADV. In conclusion, heating contaminated farm equipment to at least 80°C, for at least one hour is optimal to inactive ADV.

COMPARISON OF IN VIVO AND IN SITU THREE-DIMENSIONAL KEEL BONE MODELS OF FIFTY-TWO-WEEK-OLD LAYING HENS

Kaylee Montney
Agriculture and Animal Science, Oral Presentation
Section: 5, 3:00 PM

Presentation Number: 829
Mentor(s): Cara Robison (ANIMAL SCIENCE)

As the skeletal health of laying hens is highly important, accurate quantification of bone health is essential. Computed tomography (CT) scans provide accurate measurements for bone health quantification in live birds through 3-D image analysis allowing for longitudinal studies to be conducted. 3-D images of individual bones in situ can also provide valuable information. Due to bird movement during live scans and potential damage from human handling leading up to in situ scans, individual bone 3-D models may not be equivalent to in vivo. The purpose of this study was to determine how individual in situ keel 3-D images correspond to in vivo. To do this, 125 live 52-wk-old Lohmann brown birds were CT scanned in restraint limiting devices. After scanning, birds were transported to a laying hen facility. Within two hours, all birds were humanely euthanized and had keel bones removed according to standard procedures. All keels were sealed in plastic and frozen, then thawed at time of in situ scan. 3-D models were created from CT scans using Materialise software (Plymouth, MI, USA). A triangular mesh was overlaid over entire keel and using four points in vivo keel images were superimposed onto in situ keel images. For normalization, the proximal portion of each keel was removed. Analysis was conducted to calculate mm difference between each keel's in vivo and corresponding in situ mesh. Results will be presented upon completion at the forum and will aid in improving the use of CT and 3-D models in laying hen research.

ANTHROPOLOGY

THE MYSTERY COINS' HISTORY
Jacqueline Fayad
Anthropology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 179
Mentor(s): Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Currency today decreases in value every year but some ancient coins hold greater value now than they did during their time. After collecting some rusty Roman resembling coins off a beach in Syria, they were professionally appraised. However, the results did not completely satisfy the eagerness and curiosity about the history behind these coins. Using Scanning Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS) the composition of the coins and the elements in it were examined. The results from these tests were compared with the materials available during that period of time to see if it was possible that these coins were made then.

GAMING PIECES IN ASIAN DIASPORA ARCHAEOLOGY
David Mainero
Anthropology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 180
Mentor(s): Stacey Camp (ANTHROPOLOGY)

My undergraduate research has combined the fields of historical archaeology and material sciences in an effort to shed light on the trade networks of the Asian diaspora. This project analyzes gaming pieces recovered from five Asian diaspora archaeological sites in the United States and Canada. Experimentation in the Material Sciences technology of SEM and EDS has helped to examine the compositional relationships of these pieces within and across their archaeological sites. In conjunction with the archaeological methods of research and

comparison, the use of this technology provides an alternative lens to the analysis of material culture.

INTRAOBSERVER ERROR IN DIGITAL CRANIOMETRIC METHODS

Sarah Tabler
Anthropology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 181
Mentor(s): Gabriel Wrobel (ANTHROPOLOGY)

Recently, software and digital analysis has become increasingly prominent in archaeological research. Many programs appear to offer not only simpler and faster options than traditional methods, but also more accurate data. In this study, nineteen craniometric measurements were taken on twelve crania from various populations. Measurements were taken using three different methods: traditional metal calipers, a Microscribe with the 3Skull program, and Stratovan Checkpoint with three-dimensional models made through Photoscan. Statistical analysis was done using mean difference, method error statistic and paired t-test comparisons to reveal significant inaccuracies in measurements across the three methods. This study provides evidence challenging the notion that digital methods lack the inaccuracies of traditional caliper measurements. Craniometric measurement inaccuracies will have implications in bioarchaeology, but also forensics, primatology, clinical anatomy, and human evolutionary studies. For craniometric software to be a viable resource, there is a need for further development to provide more accurate means of data collection.

THE ROLE OF MICROBIAL INVASION IN HUMAN BODY DECOMPOSITION

Christopher Reyes
Anthropology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 182
Mentor(s): Joseph Hefner (ANTHROPOLOGY)

Human decomposition research is an emergent subfield of forensic anthropology with potential to greatly aid in the identification process. The study of human decomposition is increasingly investigated by various universities across the nation. Recent efforts have focused on developing methods for quantifying gross decomposition, understanding new factors that affect decay, and using technology, like remote sensing, to locate human remains rapidly. These new advancements, however, still leave room for more research on intrinsic factors, such as drug use, personal health, and how the microbiome affects the rate of decomposition. The human microbiome plays an important role in human decomposition. It is currently helping forensic anthropologists predict postmortem interval and is extremely important in identifying molecular contributions to decomposition. I will demonstrate the role microbial invasion plays in decomposition and how the action of opiates modulate in this process.

MATERNAL INTER-BIRTH INTERVAL IN RELATION TO MACRONUTRIENT CONTENT IN HUMAN MILK

Gasana Elyvine
Anthropology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 183
Mentor(s): Amelia Odo (ANTHROPOLOGY), Masako Fujita (ANTHROPOLOGY), Nerli Paredesruvalcaba (ANTHROPOLOGY)

Background: Human milk nutrients play an important role in infants' growth and development. Research indicates that human milk macronutrient content varies with factors related to

maternal disease and nutritional stress (such as anemia). The Maternal Depletion Hypothesis (MDH) predicts that shorter inter-birth interval (IBI) will deteriorate maternal nutritional status while longer IBI will help counteract such nutritional deterioration. In breastfeeding mothers, IBI may have influence on milk nutrient content. This research evaluated the hypothesis that longer IBI will predict higher milk macronutrient content (fat, lactose, and protein). Methods: We used a dataset of a sample of breastfeeding Ariaal women (n=55) from northern Kenya. IBI was calculated as the months between the infant's birth and the preceding birth. Correlations between IBI and each macronutrient were tested. For milk variables that had a significant correlation with IBI, regression models were constructed to adjust for possible covariates. Results: Only protein had a significant correlation with IBI. After adjusting for maternal age, time postpartum, parity, and anemia, IBI was a positive predictor for milk protein (β= 0.004; p=0.040). None of the adjustment variables were associated with milk protein. Conclusion: The results partially support our hypothesis: longer IBI predicts higher milk protein but not other macronutrients. These findings suggest that shorter IBI may decrease milk protein concentration (but not lactose or fat). By specifically examining milk variation in relation to maternal reproductive history, this research adds to the literature on the MDH and its implications for infant health and development.

ASSESSING AFFECTIVE IMPACT OF FILM AND ART WORK RELATED TO HUMAN RIGHTS AND TRANSITIONAL JUSTICE

Isabel Hershey
Anthropology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 184
Mentor(s): Elizabeth Drexler (ANTHROPOLOGY)

Creative works have the potential to affectively engage people in topics about social justice inequities and violations. Creating an anthropological methodology requires the use of qualitative data collection and analysis. This research project seeks to discover necessary steps to develop a methodology that enables the researcher to qualitatively analyze how art affectively impacts individuals and motivates their engagement with cases of violence, genocide and human rights. By displaying images believed to be affective in nature for audiences to observe, surveying students involved during varying stages of the project, and discovering what qualitative data collection procedures are helpful during the research process, the researchers establish if it is or is not possible to create such a methodology. In this research, autoethnography contributes to discovering what issues the researchers can address. The patterns that form when analyzing what imagery inspires what affects are helpful in this determination. Additionally, learning how these images inspire affective action—corresponding to the artist's intent or not—contributes to this study. It is difficult to measure affect other than in individual reflections or external actions, and thus this is an ideal approach. For example, images with themes of climate injustice prove to elicit sadness, stress, and concern. Images with themes of oppression elicit empowerment and prove to inspire a search for more information. The researchers hope to use patterns to inform how to structure their methodology by qualitatively describing powerful imagery and the responses they invoke and studying external actions in relation to social justice.

SEXUAL DIMORPHISM & BIOLOGICAL DISTANCE ANALYSES OF POSTCRANIAL MACROMORPHOSCOPIC TRAITS IN TWO MEDIEVAL NUBIAN CEMETERIES

Clara Devota
Anthropology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 186
Mentor(s): Micayla Spiros (ANTHROPOLOGY)

Eclipsed by Ancient Egypt to the north, the kingdoms of Nubia represent an untapped trove of anthropological data for exploring the cultures and peoples of Northern Africa. This research aims to mitigate the lack of understanding of Nubian populations through analyses of sexual dimorphism and biological distance (biodistance) between two medieval cemeteries located in the 4th cataract of the Nile River. Data from adult individuals, excavated by The British Museum and Michigan State University, were collected for eleven postcranial macromorphoscopic (MMS) traits as defined by Spiros (2019). Two Mis Island cemeteries, 3-J-10 and 3-J-11, now inundated beneath the Nile River are the focus of this study. The Mis Island Nubian Collection is currently housed at Michigan State University; the 3-J-10 cemetery was used from 1100-1500 AD while the 3-J-11 site was used continuously from 300-1400 AD. The frequency data will be subjected to chi-squared tests of independence to explore sexual dimorphism of the postcranial MMS traits within and between each cemetery. Inter-site variation will be statistically quantified and will visually express the relatedness between 3-J-10 and 3-J-11 to understand the biological continuity through micro-evolutionary processes (i.e., genetic drift, gene flow, mutation, selection) between the sites. Cranial MMS traits have shown value in biodistance data analysis (Hefner, 2016), though use of postcranial MMS traits for biodistance studies remains unexplored. The conclusions of this study shall remedy the scant historical record of Nubia and provide a basis for further inquiries on the employment of postcranial MMS traits in bioarchaeological studies.

LEND A HAND ON THE LAND: A LAND GRANT SCHOOL DURING WWII

Reid Ellefson-Frank

Anthropology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 541
Mentor(s): Ben Akey (ANTHROPOLOGY), Grace Gerloff (ANTHROPOLOGY), Stacey Camp (ANTHROPOLOGY)

WWII and the GI bill fundamentally changed both the physical and academic structure of Michigan State University. Pre-WWII, the student body was predominantly female, while the GI bill brought a huge influx of male students into the college. Under the administration of President John Hannah our institution went from Michigan State College, a school primarily focused on serving the agricultural needs of local farmers, to Michigan State University, which featured a much wider range of courses and majors reflecting the new and more global views held by President Hannah. Using archival research, our aim is to track the change from the pre-war MSC to the post-war MSU. Research interests include the increase of the student population and its effect on East Lansing, structural additions, changes in the courses being offered at the university, and any artifacts found by the Campus Archaeology Program that date to the immediate post-war period, with specific interest in the area occupied by the Quonset huts erected to house the newly enrolled GIs. This goal will be accomplished by compiling data from purchasing and enrollment records, student publications, memos from the office of President Hannah, photos and maps of campus, and the CAP artifact collection. A featured artifact will be researched and photographed for the poster. With this, we hope to provide people with a better understanding of the transition from college to university during a pivotal point in Michigan State's history.

OSTEOBIOGRAPHICAL ANALYSIS OF A PARTIAL SKELETON FROM CAESAREA MARITIMA

Audrey Yoo

Anthropology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 542
Mentor(s): Gabriel Wrobel (ANTHROPOLOGY)

This research takes an osteobiography approach to the study of a partial, unprovenanced skeleton recovered from the archaeological site of Caesarea Maritima, Israel. Features of the skeleton were examined to estimate age, sex, stature, and ancestry, and to identify signs of pathology and taphonomic alterations to the bone. Additionally, the individual had a filling in one of the molars, and the composition of the metal was analyzed with XRF analysis, which uses X-rays to detect the presence of elements within a specified range in the period table. A tooth filling can provide information about the deceased individual's culture, time period, and economic status. The data collected from the skeleton are discussed alongside other contextual information, including associated grave goods and historical/ archaeological information about the site. Specifically, the presence of tooth fillings and the relatively good preservation of the skeleton indicate that the individual was likely interred much later than the other Medieval Period skeletons excavated at Caesarea.

PALEOPATHOLOGICAL CASE STUDY ON AN ANCIENT MAYA INDIVIDUAL WITH ATLAS-OCCIPITAL FUSION: ETIOLOGY AND EFFECTS ON MOBILITY

Bianca Ganaway
Anthropology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 543
Mentor(s): Gabriel Wrobel (ANTHROPOLOGY)

The aim of this study is to carry out a differential diagnosis of a fusion of the first vertebra (atlas) with its corresponding occipital bone that was observed on the skull of an ancient Maya individual. The individual was recovered from a mortuary deposit at the Classic period (AD 600 – 900) archaeological site of Je'reftheel (aka, Franz Harder Cave), a small cave in central Belize, and are curated in the MSU Bioarchaeology Laboratory. This paleopathological analysis seeks to determine the cause of the malformation and to describe its likely consequences for the individual's life experience. The individual's skull and spinal column, which, were closely examined, noting indentations, fractures and other significant characteristics that aid in determining the condition's etiology. The results of the analysis will be discussed within the context of Classic Period Maya society in central Belize.

THE MUSEUM OF BELIZE DIGITAL HERITAGE PROJECT

Mia Pardel
Anthropology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 544
Mentor(s): Gabriel Wrobel (ANTHROPOLOGY)

Digital heritage helps take archaeology to the public. Recent advancements in 3D modeling and web-based applications have aided schools and museums around the world by creating tools for education and research. My project's objective is to use these technologies and applications to create a website in conjunction with the Museum of Belize for educational purposes. I began by creating 3D photogrammetry models of artifacts from the museum's collections using photographs taken previously by students from the MSU Bioarchaeology Laboratory. This collection includes different kinds of artifacts, such as lithic points, pottery, and stone carvings. I uploaded the completed 3D models to Sketchfab, an online resource for storing and sharing 3D models, where I can set viewing parameters and change lighting to optimize their appearance. I am currently working with the Cultural Heritage Informatics Initiative at MSU to create a permanent online repository for these 3D models, and with the Museum of Belize to incorporate contextual data about each of the artifacts. These will be incorporated into an informational website focusing on Belize's history, which will be hosted by MSU and managed by the Museum of Belize.

METHODOLOGY AND MORPHOLOGY IN THE ANALYSIS AND INTERPRETATION OF HARRIS LINES

Ayla Schwartz
Anthropology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 545
Mentor(s): Gabriel Wrobel (ANTHROPOLOGY)

Harris lines, first defined by H.A. Harris as transverse radiopaque lines found on tibiae, have been a staple of stress assessment since the late 50s. Thought to represent the position the epiphyseal plate of the bone was located at when a bodily or psychological insult caused growth arrests, Harris lines are used to assess stress levels as well as life history in bioarchaeological investigations. However, recent research by Scott and Hoppa (2014), Nowak and Piontek (2011), Durray (2011) has called into question both the validity of Harris lines as stress indicators as well as the consistency of the methodology we use to identify Harris Lines. We used microCT imaging analyzed in efXCT and BoneJ software to assess how changes in radiographic technique can affect the results of a Harris line study, as well as exploring how differential morphologies observed among Harris lines can affect the chances of misidentification.

MORPHOLOGICAL TOOTH COMPARISONS OF ANCIENT MAYA POPULATIONS IN BELIZE

Sabrina Ruff
Anthropology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 546
Mentor(s): Gabriel Wrobel (ANTHROPOLOGY)

Tooth morphology is often used to measure the genetic relationship between human groups. Three different Maya mortuary populations from central Belize were scored using the ASU dental anthropology system. These three populations are from the archaeological sites of Je'reftheel, Pook's Hill, and Actun Kabul, all of which date from the 6th to 9th centuries AD. These data, representing a regional population, were compared with similar data from other Maya mortuary groups in other parts of Belize to determine whether patterns of genetic relatedness reflect expected relationships as hypothesized by archaeological models. This study also explores the possible effect of inter- and intra-observer error. Other difficulties in data collection were related poor preservation, problems with recovery, dental disease, and the cultural practice of tooth filing. Research findings include differences in molar cusp number, caries, and in presence and development stage of the third molar. Many other traits were found to be the same or similar between the populations as well.

BIOLOGICAL POPULATION AFFINITIES AMONG ANCIENT POPULATIONS IN THE NEAR EAST THROUGH AN ANALYSIS OF NONMETRIC CRANIAL TRAITS

Alaina Brenner
Anthropology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 547
Mentor(s): Gabriel Wrobel (ANTHROPOLOGY)

This bioarchaeological research study is intended to explore biological population affinities among ancient populations in the Near East through an analysis of nonmetric cranial traits. The focus of the study is a collection of Bedouin crania from the site of Caesarea Maritima, located on the Coastal Plain of Israel. Nonmetric trait frequencies from Caesarea were compared to data collected in previous studies of other groups in the region. Using the Osteoware computer program for recording, 17 cranial traits were scored as present, absent, or unobservable. Biological distance between Caesarea and the other regional groups was

calculated using statistical measures of similarity. This provides a dendrogram, demonstrating the genetic relationship of the Caesarea Bedouin population with their neighbors. Non-metric features of the cranium are of great value to researchers for the assessment of both hereditary lineages and in finding the degree of population relation.

AUTONOMOUS VEHICLES AS A SOLUTION TO BARRIERS TO TRANSPORTATION

Paige Cordts
Anthropology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 548
Mentor(s): Tamara Bush (MECHANICAL ENGINEERING)

Individuals with physical disabilities face many challenges in modern society, one of the largest being barriers related to transportation. The most common forms of transportation used by physically disabled individuals are personal vehicles driven by themselves or friends and family, public transport, and paratransit services. However, all of these methods have many constraints, such as time needed for planning and travel, availability, and cost. While challenges for individuals with physical disabilities have been identified, there has been little research on the thoughts of this group using autonomous vehicles as a solution. Therefore, we designed a comprehensive survey to document individuals' current experiences with public transportation and collect their thoughts on autonomous vehicles as a solution to the problems they face. The survey asked about both their overall attitude towards the safety and probability of use of autonomous vehicles, as well as the internal and external features they would need in place to comfortably use autonomous vehicles as a primary or supplemental mode of transportation. Thus far, results indicate that many respondents believed autonomous vehicles to be relatively safe and would be willing to use them. They also provided feedback on several features they would like to see in place, such as voice control and electronic screens to communicate to the vehicle.

THE BEST INTENTIONS: AN EXPLORATION OF CROSS-CULTURAL INTERACTIONS AND HUMANITARIAN AID IN RURAL MOZAMBIQUE

Ian Donahue
Anthropology, Oral Presentation
Section: 3, 1:30 PM
Presentation Number: 847
Mentor(s): Omowumi Elemo (JAMES MADISON COLLEGE)

In 2019 the East African nation of Mozambique, currently ranked as having one of the lowest GDPs per capita in the world, suffered the impact of two devastating cyclones in as many months. In response to the damage inflicted, various international humanitarian teams directed their efforts to distribute emergency aid throughout the country, including in remote island and inland communities along the coast. This paper explores the effect of cross-cultural interactions on the distribution of aid within these rural communities via the lenses of Cultural Anthropology and theories of cross-cultural communications. Through a brief case study of the interactions between primarily international aid workers, and the local recipients of aid, we can examine the influence of differences in culture, race, religion, and class status on communication during the distribution of aid in a post-colonial nation. The insight for this topic comes from both scholarly sources such as anthropologist Clifford Geertz as well as anecdotal insights from primary sources and my own reflections on personal experiences as an aid worker in Mozambique and Madagascar. This paper suggests ways in which inherited values, conceptions, and internalized histories may form barriers to communication and asks in what ways, if any, these barriers impact the effective distribution of emergency aid in rural Mozambique.

CRITICAL REFLECTION AS A TOOL FOR GIRL EMPOWERMENT

Kianna Delly
Anthropology, Oral Presentation
Section: 3, 1:45 PM
Presentation Number: 848
Mentor(s): Kevin Brooks (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

This presentation focuses on using critical reflection in civic engagement. This past summer I worked with a girl's empowerment organization. I helped supervise a group of young women, ages 15-18, during a week long summer camp. This camp focused on female empowerment and the importance of fostering a sisterhood. The journey to building this sisterhood was challenging and emotional for everyone involved, myself included. The relationships between the young women went through peaks and valleys. By the end of the camp, the girls developed the strong sisterhood that they came to the camp seeking. Watching the girls learn more about themselves and cultivating their skills in communications, respect, and understanding helped me to deepen my understanding of these skills. I have learned much more.

PIECING TOGETHER A STORY: AN OSTEOBIOGRAPHY OF A POSTCLASSIC MAYA INDIVIDUAL

Katie Whalen
Anthropology, Oral Presentation
Section: 3, 2:00 PM
Presentation Number: 849
Mentor(s): Gabriel Wrobel (ANTHROPOLOGY)

An osteobiography is a valuable tool used by bioarchaeologists to learn about the life and death of individuals from their skeletons. I carried out an osteobiographical analysis of a Maya individual from the Early Postclassic period (AD 1000 – 1300) archaeological site of Laguna de On Island in Northern Belize. The individual is currently in curation at the Michigan State University Bioarchaeology Laboratory. By comparing measurements of the individual's skeleton to known values from reference samples, I was able to determine the individual's sex, stature, ancestry, and age. I also evaluated the skeleton for evidence of trauma, cranial and dental modifications, pathologies, and taphonomic alterations. These osteobiographic data are discussed in the social and environmental context in which the individual lived.

THE CURRENT STATE OF KIDNEY TRAFFICKING IN SOUTH ASIA

Rida Khan
Anthropology, Oral Presentation
Section: 3, 12:15 PM
Presentation Number: 850
Mentor(s): Md Moniruzzaman (ANTHROPOLOGY)

According to the World Health Organization, more than one human organ is sold every hour. Bodily organs, mostly kidneys, are bought and sold because of the wide gap between their demand and legal supply. Thus, patients in need of kidney transplants resort to the region with the largest supply. South Asia: India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan, Afghanistan and the Maldives has been known as the hot spot for organ trafficking for more than two decades. Kidney trafficking is a global issue which ignores national boundaries, and within these South Asian countries we can observe the interplay among the different players (buyers, sellers, brokers, and doctors) and also observe recurring themes such as the exploitation of vulnerable populations, the legalities of organ purchase, the networks of organ trafficking (including internal and external), and the expansion of medical tourism. Drawing on extensive scholarly literature and popular media review, we have analyzed pre-existing data to create overarching themes and provide a cohesive summary of the black market of

live kidneys in these countries. With this attempt, we map out how kidney trafficking is currently occurring across South Asia.

BIOCHEMISTRY & MOLECULAR BIOLOGY

THE ORIGINS OF LIFE

Jack Huber
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 33
Mentor(s): R Root-Bernstein (PHYSIOLOGY)

The Miller-Urey experiment (1952) attempted to explain the emergence of biomolecules by simulating early Earth conditions in a glass apparatus that was heated and armed with a high voltage electrode. Our experiment replicates Stanley Miller's original while adding in sea salt instead place of sterile water. The addition of these salts better replicates early Earth conditions as well as enables the formation of more complex molecules found in life, such as ATP. Using Mass Spectrometry, a plethora of diverse molecules were consistently identified including the amino acids Glycine, Serine, and Uracil. Urea and formamide were also identified as well as Myristic acid and Octadecanoic acid which both can lead to the formation of lipids. One of the most substantial findings was the synthesis of ATP in the apparatus, which was detected multiple times in recent runs and encourages the idea that life could have formed this way on Earth.

NATURE'S INSECTICIDE: DIVERSE ACYLSUGARS PRODUCED BY PLANTS AFFECT MANDUCA SEXTA GROWTH DIFFERENTLY

Liz Christensen
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 34
Mentor(s): Robert Last (BIOCHEMISTRY & MOLECULAR BIOLOGY), Yann Ru Lou (BIOCHEMISTRY & MOLECULAR BIOLOGY)

Every year 10-40% of crops are lost to pests. In addition, conventional pesticides pollute soils, water, and intoxicate fish and birds. Plants in the Solanaceae family produce a group of specialized metabolites, called acylsugars, that can be utilized as novel, effective, and environmentally safe pesticides. What is not known, is whether different acylsugar structures affect anti-herbivory activities. Assessing the anti-herbivory activity of various acylsugars in plants is often hindered as other defense traits tend to interfere. We obtained CRISPR/Cas9-mediated mutant plants with an altered pathway of acylsugars (editing was done to the Acylsugar Fructofuranosidase 1 (ASFF1) gene) in wild tomato, S. pennellii, to overcome this hurdle.This created plants that accumulated acylsucroses instead of the normal accumulation acylglucoses. These plants provide an ideal system for testing the effects of a sugar core on herbivore performance in a climate controlled natural isogenic background. Our results suggest that acylsucroses have larger negative effects on the performance of the specialist, Manduca sexta. We seek to validate this result with a backcross integration line (BIL6180) that produces S. pennellii-type of acylsucroses in Solanum lycopersicum background. We compared M. sexta performance on BIL6180 which produced an accumulation of acylsucroses, and BIL6180 transformed with ASFF1 which produced an accumulation of acylglucoses. Consistent with previous results, M. sexta caterpillars perform better on the acylglucose producing transgenic line. Acylsugars effectively improves agricultural usage and unleashes the potential of sustainability, using acylsugars as safe pesticides. Our project is the first step which can lead to a bright future.

CHARACTERIZATION OF A TOMATILLO ACYLTRANSFERASE ENYZME INVOLVED IN ACYLSUGAR BIOSYNTHESIS

Nnamdi Onyene
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 35
Mentor(s): Craig Schenck (BIOCHEMISTRY & MOLECULAR BIOLOGY), Robert Last (BIOCHEMISTRY & MOLECULAR BIOLOGY)

Sugar esters (acylsugars) are defensive metabolites produced throughout the Solanaceae (nightshade) family, which includes tomato, potato and peppers. Acylsugars consist of a sugar core with various length acyl chains, which are esterified by acyltransferase enzymes localized in the trichomes. Metabolite profiling in tomatillo, a fruit-crop closely related to tomato, showed acylsugar accumulation on the fruit surface unlike trichome-synthesized acylsugars in other Solanaceae species. To gain insight into tomatillo acylsugar biosynthesis, candidate acyltransferase genes were cloned into protein expression vectors and recombinant enzymes were purified using affinity chromatography. Substrate specificity of the recombinant acyltransferase was analyzed using sucrose and acyl chain CoA substrates varying in carbon chain length from 4 to 18. Assays containing sucrose with a single CoA substrate showed that the acyltransferase used most of the CoAs tested, demonstrating broad substrate specificity, but had highest activity with C12 CoA. This result was tested using sucrose and a mixture of CoAs of chain lengths 10, 12, and 14, which validated that the acyltransferase preferred C12 CoA. These results are consistent with the hypothesis that the acyltransferase catalyzes the first step in tomatillo acylsugar biosynthesis. Currently we are working on identifying the remaining acylsugar biosynthetic steps in tomatillo. Better understanding of acylsugar biosynthesis in tomatillo allows us to reduce acylsugar content on fruit surfaces making harvesting more efficient or enhancing the production of acylsugars to provide greater protection for the plant against insects reducing reliance on pesticides.

EXPLORING THE BIOCHEMICAL PATHWAY OF ACYLSUGARS IN BLACK NIGHTSHADE

Rachel Arking
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 36
Mentor(s): Robert Last (BIOCHEMISTRY & MOLECULAR BIOLOGY), Yann Ru Lou (BIOCHEMISTRY & MOLECULAR BIOLOGY)

Specialized metabolites in plants provide humans with medicines, food additives, and natural insecticides. The Solanaceae plant family produces a group of specialized protective metabolites called acylsugars that can act as plant defense against herbivores. There are a wide variety of structurally diverse acylsugars in plants. While tomato (Solanum lycopersicum) accumulates mostly acylsucroses, Solanum nigrum, or black nightshade, accumulates predominantly acylglucoses. We seek to figure out which enzyme contributes to the biosynthesis of this novel acylsugar to aid in agricultural advances. With phylogenetic approaches, we narrowed down a list of candidate genes. These genes are homologs of well-characterized ASATs (Acylsugar Acyltransferases) in S. lycopersicum and share characteristic trichome enrichment. A previous in vitro enzyme assay study revealed a hypothetical, biosynthetic pathway for acylglucoses in S. nigrum. We performed Virus-Induced Gene Silencing (VIGS) on candidate genes to confirm in vivo functions. Through VIGS, we took a viral vector with the gene of interest and initiated the silencing of five different ASAT target genes by infecting the plant with engineered Agrobacterium strains. Silencing early steps (ASAT1 and 2) of the hypothetical pathway resulted in a general decrease of acylglucose accumulation. Consistent with previous enzyme assays, our results revealed the critical role of

Acylsucrose Fructofuranosidase (ASFF) in acylglucose formation and confirmed that ASAT5 decorates di-acylglucoses with an acetyl group. Together, these experiments evaluate the biosynthetic pathway for acylglucose formation in S. nigrum. They provide interesting homologous enzymes with substrate that may be useful for enzyme engineering.

INVESTIGATING CYTOCHROME SECRETION FOR IMPROVING BIOFILM CONDUCTIVITY IN SHEWANELLA ONEIDENSIS

Grace Grove
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 37
Mentor(s): Michaela TerAvest (BIOCHEMISTRY & MOLECULAR BIOLOGY), Shaylynn Miller (BIOCHEMISTRY & MOLECULAR BIOLOGY)

Rising concerns about climate change are driving research in alternative energy sources and greenhouse gas reduction methods. We seek to develop a carbon capture and fuel synthesis technology known as microbial electrosynthesis. In the bacterium Shewanella oneidensis, electron uptake via a bidirectional path could be used to reduce CO2 to fuels and chemicals using excess electrical energy from renewable sources. Recent work from our lab used inward electron transfer, driven by an electrode, to power intracellular reduction reactions in S. oneidensis. We aim to increase the bacteria's ability for electrosynthesis by increasing its conductivity in a biofilm. One promising approach to enhance conductivity is to integrate a protein called OmcS, an extracellular cytochrome native to Geobacter sulfurreducens, into S. oneidensis. OmcS is among the cytochromes hypothesized to contribute to the robust conductivity of G. sulfurreducens biofilms and could enhance the conductivity and thickness of S. oneidensis biofilms. We have successfully expressed OmcS in S. oneidensis; next, we will attempt to localize the protein to the outside of the cell via an existing secretion pathway. We will fuse a signaling peptide of a native cytochrome found in the outer membrane of S. oneidensis to OmcS. As a proof of concept, we have fused the signaling peptide to green fluorescent protein (GFP) and measured intracellular and extracellular fluorescence for tagged and non-tagged GFP. Experiments are currently underway to assess the efficacy of this secretion system for nonnative proteins.

INVESTIGATING THE EFFECTS OF MITOCHONDRIAL TRANSPORT PROTEIN ON CARBON ALLOCATION IN CAMELINA SATIVA

Skylar Zemmer
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 38
Mentor(s): Danny Schnell (PLANT BIOLOGY)

The low-CO2 inducible protein with a weight of 36kD (LIP-36) is a mitochondrial transport protein, characterized in Chlamydomonas reinhardtii with importance to the algae's carbon concentrating mechanism. This research aims to investigate the effect of LIP-36 on carbon metabolism in the roots of Camelina sativa. Previously, it has been observed that camelina seedlings expressing LIP-36 produce a longer tap root than wildtype seedlings, a difference which is exaggerated in short day conditions. Grown in an ebb and flow hydroponics system, LIP-36 and wildtype plants were harvested and measured for weight and length of roots and green tissue. In another experiment, mature leaves and roots of LIP-36 mutants and wildtype plants were collected and assayed for sucrose and starch concentrations throughout the day. Results of the growth trials confirmed that LIP-36 plants produce a longer tap root shortly after germination, although the weight of root tissue between LIP-36 and wildtype plants is not significantly different. As the plants matured, root lengths became more similar. Assays for carbohydrates will provide an overview of the plant's carbon utilization under various

metabolic conditions influenced by circadian rhythm and light availability. Preliminary results suggest that LIP-36 mutants do allocate and utilize carbon between the roots and leaves differently than wildtype plants. Further analysis provides insight as to how LIP-36 affects carbon distribution, and how a change in metabolism may be responsible for differences in early root development, as well as implying effects of LIP-36 expression on overall metabolism of the organism.

INVESTIGATING AND COMPARING THE EFFECTIVENESS OF PREDICTED THERAPY IN REDUCING THE SIZE OF MAMMARY TUMORS AND PREVENTING METASTASIS IN MICE WITH METASTATIC BREAST CANCER

Rachel Kubiak
Biochemistry and Molecular Biology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 39
Mentor(s): Eran Andrechek (PHYSIOLOGY)

Recent breast cancer studies have predicted that 276,480 women in the United States will be diagnosed with invasive breast cancer in the year of 2020, and 42,170 of those cases will result in death. Therefore, it is crucial that we are proactive in developing treatment plans and medications that increase survival rates and allow for improved prognoses of patients diagnosed. In this presentation, I will discuss the results of the project that I have been conducting this semester. I analyzed the effectiveness of two newly formulated drug treatments on cell lines in mice to decide if the drug can be further tested in clinical trials on human subjects. Essentially, I will observe their role in the prevention of metastasis, and whether or not the drug successfully decreased the size of mammary tumors. I will grow and inject cell lines into the mammary glands of 20 mice. Once the tumors reach 6mm, I will perform 21 days of drug treatment, and the control through oral gavage. This will include two different drugs that will be used solely as well as in combination. I will palpate and record measurements of the tumors daily to determine whether or not the growth of the tumors remained unchanged or decreased. After completion of the treatment, I will necropsy the mice and examine tumors, mammary glands, lungs, and any potential masses using histology. The goal is to determine whether the drug treatment regimen will prevent the cancer from spreading and decreasing the size of the tumor.

FUNCTION OF TIP GROWTH DEFECTIVE1 PROTEIN IN ARABIDOPSIS THALIANA

Jennifer Lee
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 203
Mentor(s): Sheng-Yang He (PLANT RESEARCH LABORATORY)

The S-acylation Growth Defective (TIP1) protein is theorized to play a crucial role in plant survival. Dr. Yuti Cheng in Sheng Yang He's lab at Michigan State University recently found that the Arabidopsis thaliana TIP1 mutant displays a phenotype of dysbiosis in leaves and abnormally short root hairs. How TIP1 functions in root hair development and leaf dysbiosis is not clear. Two objectives were assigned in order to determine the full function of this protein. First, a highly specific antibody is needed in order to be able to detect its presence in samples. DNA recombination was performed with strains of Escherichia coli to express the TIP1 protein in high amounts. Several colonies were collected from the recombined E. coli and the proteins were purified using Ni-NTA purification. The purified proteins were analyzed in SDS-PAGE to determine the purity and Western Blot Analysis will be performed to find the sensitivity of the designed antibodies for TIP1. The second approach to finding TIP1's function is to find the interactions of TIP1 with other proteins in A. thaliana. Using immunoprecipitation followed by mass spectrometry, it was found which specific proteins have interacted with

TIP1. If this protein is deemed to be a significant player in root hair development and leaf microbiome, it can aid in further research on overall plant health.

THE EFFECT OF CALCIUM ON MITOCHONDRIAL ULTRASTRUCTURE AND FUNCTION

Benjamin West
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 204
Mentor(s): Jasiel Strubbe (PHYSIOLOGY), Jason Bazil (PHYSIOLOGY)

Myocardial ischemia/reperfusion (IR) injury is an injury preceded by loss of mitochondrial function caused by calcium overload. Despite the well-known effects of this phenomenon, it is unknown how calcium alters mitochondrial bioenergetics through changes in mitochondrial structure and cristae morphology. This is significant since the main cause of cardiac tissue and cell death after myocardial infarction is mediated by calcium overload. The objective of this project is to characterize how calcium modulates mitochondrial morphology using well-established cryo-electron microscopy (cryoEM) in the presence of the cardioprotective agent cyclosporin A and the calcium chelator EGTA during calcium overloaded conditions. The structural data reveal that increasing levels of calcium content disrupt cristae junctions with a lamellar rather than tubular appearance and it is associated with calcium phosphate deposits. In addition, the data also reveal the cardioprotective agent cyclosporin A preserves the cristae morphology. By correlating structural and functional data, we show that maintaining the cristae integrity prevents mitochondria from losing function. Overall, these findings establish a mechanism of calcium-induced mitochondrial dysfunction and reveal new, potential targets for cardioprotective therapies responsible for maintaining cristae structure and function.

FLUOROMETRIC ANALYSIS OF REACTIVE OXYGEN SPECIES PRODUCTION BY SUCCINATE DEHYDROGENASE (SDH)

John Robertson, Joshua Richardson
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 205
Mentor(s): Jason Bazil (PHYSIOLOGY)

Heart disease is the leading cause of death in the US. Patients with heart disease suffer from a pathological condition called reperfusion injury, an unavoidable injury to the heart caused by oxidative damage. One of the major sources of pro-oxidants, or free radicals, in the heart is succinate dehydrogenase (SDH). As the mechanisms of reactive oxygen species (ROS) production by SDH is poorly understood, we sought out to better characterize free radical production from this enzyme. We used the well-established horse radish peroxidase and amplex ultrared assay to fluorometrically measure ROS production by SDH from guinea pig cardiac mitochondria with different electron donor (succinate) and acceptor (decylubiquinone, DQ) concentrations. In the absence of DQ, our results agree with prior findings that succinate decreases ROS production by binding to the FAD site. At the succinate concentration that elicits maximal ROS production from SDH, the addition of increasing DQ concentrations caused a significant drop in the ROS production rate. Surprisingly, at high succinate concentrations, the opposite trend was observed, as ROS production increased. We speculate that these conditions induce ROS production at a second site on the enzyme, the Q-reductase site. At high DQ concentrations, ROS production rates converged regardless of the succinate concentration. Therefore, ROS production from SDH is complex and highly condition specific. To further elucidate the mechanisms of ROS production by SDH will require a detailed computer model. By acquiring more mechanistic

information, better therapeutic approaches can be developed to minimize the extent of reperfusion injury caused by SDH.

INTERACTIONS OF LATE STAGE ENDOSPORULATION PROTEINS

Maura Barrett
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 206
Mentor(s): Lee Kroos (BIOCHEMISTRY & MOLECULAR BIOLOGY), Sandra Olenic (CELL AND MOLECULAR BIOLOGY PROGRAM)

Bacillus subtillis is a Gram-positive soil bacterium that undergoes endosporulation during starvation conditions. During endosporulation, the transcription factor, σ K , is activated by the intramembrane metalloprotease, SpoIVFB. Two inhibitory proteins, SpoIVFA and BofA, are involved in regulating SpoIVFB activity, preventing cleavage of the 21-residue pro-domain of Pro-σ K . Signaling from the forespore releases this inhibition during the late stage of sporulation. Activation of σ K RNA polymerase results in gene expression of products that form the spore coat and lyse the mother cell. It is currently unknown how BofA and SpoIVFA interact with each other and with SpoIVFB. Previous work has suggested that BofA and SpoIVFA may interact through their C-terminal regions. To study this, Escherichia coli was engineered to express a "pET Quartet" vector containing Cys-less Pro-σ K and SpoIVFB with Mono-Cys variants of BofA and SpoIVFA. The cysteine residues were added to the C-terminal regions of both BofA and SpoIVFA. If two Cys residues are in proximity to each other, a disulfide bond will form after exposure to the oxidant Cu^2+(1,10-phenanthroline). Multiple variants were tested; however, no complex between BofA and SpoIVFA was observed by immunoblot analysis. Next, experimentation was directed towards how BofA and SpoIVFA interact with SpoIVFB. We are currently constructing two "pET Triplet" plasmids to express SpoIVFB (with and without cytTM), native BofA, and Nterminally truncated SpoIVFA in E. coli. Work from our lab shows that addition of cytTM to the N-terminal end of SpoIVFB may improve accumulation. In addition, unpublished data from our lab shows that truncated SpoIVFA is more stable and retains function when expressed in E. coli. Accumulation of these three proteins will be visualized by immunoblot analysis and interactions will be assessed through pull-down assays. Our work aims to improve knowledge of intramembrane metalloproteases and their regulation.

MERGING 3D-PRINTING WITH PROTEIN MICROFIBERS TO CONSTRUCT 3D TISSUE CONSTRUCTS

Erin Bosman
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 207
Mentor(s): Aitor Aguirre (BIOMEDICAL ENGINEERING), Brett Volmert (BIOMEDICAL ENGINEERING), Cody Pinger (INSTITUTE FOR QUANTITATIVE HEALTH)

The cardiac extracellular matrix (ECM) is a complex, yet organized arrangement of protein-microfibers which provide essential structure and functionality for the heart. The ECM gives cues to the biomechanical and biochemical cellular microenvironment, and analyzing the interactions between cells and various ECM materials could provide insight into disease and development. Many developing technologies aim to mimic the structure of the ECM; currently, electrospinning is a popular method for synthesizing fibrous structures to mimic native ECM in fiber diameter, orientation, and geometry. However, electrospinning requires high voltages and is a low-throughput method for producing fibers, making it difficult to create thick, 3D-scaffolds. Through pneumatic-spinning, a method which utilizes compressed air rather than electric charge to produce fibers, we show the rapid fabrication of porous

microfiber constructs with small fiber-diameters (~1.6 +/- 0.2 micrometers). Here, we present a method for the construction of well-aligned, directional, biomimetic fibrous scaffolds within 3D-printed channels. To test the viability of this method, fibroblast cells were seeded onto the scaffolds and their morphology and attachment to the microfibers were analyzed. This method provides an advancement in the field of tissue engineering through a physiologically similar and directionally-recognizable biomaterial architecture for the cellular microenvironment.

DHA-DERIVED OXYLIPINS ARE INVOLVED IN HEART DEVELOPMENT AND THEIR DEFICIENCY LEADS TO INCREASED RISK OF CONGENITAL HEART DEFECTS

Renee Kinne
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 208
Mentor(s): Aitor Aguirre (BIOMEDICAL ENGINEERING), Kristen Ball (INSTITUTE FOR QUANTITATIVE HEALTH)

Congenital heart defects (CHD) are the most common form of birth defects in humans, often without a known cause and affect up to ~1% of all live births. There is consensus that dietary factors are important contributors to CHD and overall fetal development, but the underlying reasons remain unexplained. We decided to examine how dietary bioactive lipids affect cardiac development in mice. Female mice were fed a diet deficient in essential fatty acids (EFAs) for 30-90 days to induce EFA deficiency (with no observed negative side effects) and were then crossed to wild-type males to produce pregnancies. Embryos were collected at E15.5 and P0 for analysis. Embryos in the EFA deficient group showed significant abnormalities, including decreased body weight, slight developmental delay, myocardial fibrosis and increased incidence of CHD (including atrioventricular septal defects and dilated cardiomyopathy), as revealed by histological analysis and magnetic resonance imaging. A group of EFA deficient females were given DHA supplemented water (rescue group) to investigate the potential role of DHA as a protective agent against CHD. DHA supplementation significantly reduced all phenotypes observed in the deficient group. Our results suggest that DHA-derived oxylipins might be involved in heart development through as of yet undescribed mechanisms. These findings could be important to develop preventive strategies to reduce and treat CHD in the clinical setting.

APPLICATION OF SLICE CLONING TO GENERATE THERAPEUTIC VECTORS

Nathaniel Pascual
Biochemistry and Molecular Biology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 209
Mentor(s): Masako Harada (BIOMEDICAL ENGINEERING), Yuki Harada (BIOMEDICAL ENGINEERING)

Seamless Ligation Cloning Extract (SLiCE) cloning uses the cell lysate of common laboratory Escherichia coli strains to facilitate homologous recombination between linear fragments with flanking heterologous sequences in a simple one-pot reaction. We describe a method to generate vectors for exosome therapeutics using SLiCE cloning whereby vectors are significantly reduced in length and devoid of DNA methylation: (1) PCR amplification of the minimum expression cassette, (2) purification of PCR product, (3) SLiCE reaction to circularize the vector, (4) Exonuclease V digestion to remove remaining linear DNA fragments, and (5) purification of the vector for downstream applications. By bypassing bacterial transformation to generate these vectors, we are able to remove bacterial DNA sequences such as antibiotic resistance markers, the bacterial origin of replication and unnecessary promoter sequences from conventional expression vectors. We hypothesized

that therapeutic vectors produced by this method would result in improved transfection efficiency and transgene expression due to reduced vector size and improved stability associated with the lack of methylation. This methylation-free construct will be compared against the mammalian expression vector pcDNA6/V5-HisA by the secretion of Gaussia Luciferase from HEK-293T cells. Additionally, another construct that is partially methylated was generated to further characterize the role of methylation in SLiCE recombination and transfection efficiency. In addition to improvements in transfection and transgene expression, the absence of bacterial sequences reduces the risk of facilitating the transfer of antibiotic resistance to environmental microbes and the chance of allergic reactions associated with residual antibiotics from the generation of traditional therapeutic vectors.

LOCATION AND SYNTHETIC MECHANISM OF COLORECTAL CANCER CELL GENERATED SNRNA CONTRIBUTION TO DIAGNOSTIC TECHNIQUES

Casey Borowsky

Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 389
Mentor(s): Ronald Henry (BIOCHEMISTRY & MOLECULAR BIOLOGY), Stacy Hovde (BIOCHEMISTRY & MOLECULAR BIOLOGY)

During tumor progression, cancer cells secrete an array of non-coding RNAs into their local tumor microenvironment. The function of these extracellular RNAs in tumor biology is uncertain, but their abundance offers an opportunity to develop novel diagnostic tests for the early detection of cancer with the goal of improving treatment prognosis. In this project, we investigated a subset of human small nuclear RNA (snRNA) that are prevalent in the serum of colorectal cancer patients focusing on the mechanistic pathway for the synthesis and secretion of tumor-derived U2 microRNA (U2 miR). Our previous studies indicate that U2 miR interferes with cell-cell communication by host immune cells thus allowing cancer cells to avoid tumor surveillance. In this cell signaling process, we hypothesized that tumor-derived U2 miRs are assembled into membrane-bound vesicles called exosomes for secretion into the tumor microenvironment. To asses this hypothesis, a 3-step exosome purification process was developed and the prevalence of U2 miR was analyzed via quantitative real time PCR. Using this assay, the steady state abundance of U2 miR in both colorectal cancer cells grown in tissue culture and the extracellular culture growth medium was determined. I further purified extracellular exosomes to examine RNA content. In contrast with my hypothesis, I observed that U2 miRs are not prevalent within exosomes, but rather are present in the soluble fraction free of vesicles. This result further indicates that these non-coding RNAs may be directly available in the tumor microenvironment as potential therapeutic targets to restore tumor surveillance.

ENHANCER ACTIVITY IN THE INTRONIC REGIONS OF THE INSULIN RECEPTOR GENE IN D. MELANOGASTER

Gabby Hardy

Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 390
Mentor(s): David Arnosti (BIOCHEMISTRY & MOLECULAR BIOLOGY), Sandhya Payankaulam (BIOCHEMISTRY & MOLECULAR BIOLOGY)

The insulin signalling pathway is highly conserved and plays important roles in metabolism, growth, and development by regulating the uptake of glucose from the bloodstream. Alterations and malfunctioning of this pathway has been shown to cause serious disease. One way the insulin signalling pathway is regulated is through expression of the insulin receptor (InR) gene. However, the detailed mechanisms for transcriptional regulation of this gene is

not well understood. In an extension of our labs previous work, we hope to create a finer image of regulatory elements in the non-coding region upstream of the InR gene. Certain fragments of the ~40 kb intronic region have already been shown to contain regulatory sequences. By breaking these pieces down further, we hope to uncover in greater detail which transcriptional factors may be binding and where on this gene. Thus far through luciferase assays in S2 insect cells, we've seen that dividing the regulatory regions into ~300 bp pieces makes them non-functional in altering expression of the InR gene. Further testing of relative activity with larger subfragments should show us more about transcription factor binding.

DETERMINING THE EFFECTS OF CAFFEINE ON THE INSULIN SIGNALING PATHWAY IN DROSOPHILA MELANOGASTER

Annie Hillenberg
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 391
Mentor(s): David Arnosti (BIOCHEMISTRY & MOLECULAR BIOLOGY), Sandhya Payankaulam (BIOCHEMISTRY & MOLECULAR BIOLOGY)

Coffee, sodas, gum, pain killers, and tea: all commonly consumed products that contain caffeine. Though caffeine is often thought of as an innocent remedy for tiredness, it is actually a drug—possibly the most widely used one at that. With so many people consuming large quantities of caffeine so often, it is important to know how it affects our bodies. In the past, there has been research showing that caffeine affects the expression of the Insulin Receptor gene and suggests that caffeine consumption is associated with a lower risk for type 2 diabetes. In order to understand how caffeine might affect gene expression and diabetes, it is important to study its molecular effects on genes in the insulin signaling pathway. I am using Drosophila melanogaster, the fruit fly, as a model system, as these animals have conserved insulin signaling components and produce insulin to regulate growth and metabolism. Twenty male and twenty female newly eclosed Drosophila melanogaster were mated, starved, and then fed caffeinated food either through a solution distributed on a kimwipe, or a solid food with caffeine for twenty-four hours. After being allowed to consume the food, the flies were immediately frozen, and their RNA was collected. Next, cDNA was produced from the RNA samples, and quantitative PCR will be performed using primers for genes of interest. As a control, I subjected flies to a brief period of fasting, a treatment that has been shown to induce expression of insulin pathway genes. I will discuss our preliminary results regarding this organism's response to caffeine and implications for human health.

INVESTIGATING A LINK BETWEEN THE CANONICAL BONE MORPHOGENIC PROTEIN PATHWAY AND THE FIBROBLAST GROWTH FACTOR PATHWAY IN EARLY EMBRYONIC DEVELOPMENT

Carlos Ferran-Heredia
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 392
Mentor(s): Amy Ralston (BIOCHEMISTRY & MOLECULAR BIOLOGY)

Because of their ability to develop into many cell types, human embryonic stem cells can be incredibly useful for regeneration of diseased tissues. However, the use of human embryos has many ethical dilemmas. Therefore, induced pluripotent stem cells (iPSCs), or somatic cells reprogrammed to stem-like cells, provide a better alternative for regenerative medicine. Because current methods for cell reprogramming are inefficient, we are studying what naturally occurs during stem cell derivation in mouse embryos. In doing so, we hope to determine a more efficient method for cell reprogramming. Our primary focus is on the

fibroblast growth factor (FGF) pathway, which has been established to induce primitive endoderm (PE) cell fates in mouse embryos. Previously, mouse embryos treated with exogenous FGF4 developed an increased quantity of PE cells in the inner cell mass (ICM) of the blastocyst, and mouse embryos with a mutated FGF4 receptor gene developed all epiblast ICM cell fates. In this study, we observed that addition of exogenous bone morphogenic protein 4 (BMP4) decreased the PE promoting effect of FGF4. Therefore, we hypothesize that the canonical bone morphogenic protein (BMP) pathway inhibits the FGF pathway. We used engineered Smad4 knockout mice, which lack an essential component of the BMP pathway, to see if the repression of BMP induced genes changes the lineage specification of FGF4 treated embryos. If our hypothesis is correct, we expect to see that embryos which lack Smad4 will be more sensitive to FGF4 treatment due to de-repression.

DEVELOPMENT OF AN INTERACTIVE, R-BASED APPLICATION FOR ANALYSIS OF TOXICOGENOMIC DATA

Jack Dodson
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 393
Mentor(s): Rance Nault (BIOCHEMISTRY & MOLECULAR BIOLOGY), Timothy Zacharewski (BIOCHEMISTRY & MOLECULAR BIOLOGY)

Initiatives to promote data FAIRness - data that is findable, accessible, interoperable, and reusable - are becoming a priority to funding agencies. These principles allow new knowledge to be derived from existing data with minimal additional investment. We have developed FAIRTox, an open source data exploration and visualization application for large gene expression datasets to enhance their FAIRness. FAIRTox is built using a R Shiny framework, chosen due to its wide use as a tool for omics data analysis, and incorporates Tableau visualizations for heightened user interaction. Additionally, targeted SQL queries enable the management and navigation of data maintained in the dbZach databases. With this application users can compare the expression of specific genes in response to various experimental factors such as circadian time as well as dose and duration of exposure to environmental contaminants. Furthermore, these transcriptomic changes can be evaluated across diverse datasets, enabling the development of novel hypotheses. Processing and accession of such large sets can prove difficult for investigators and was a major source of troubleshooting during development. Therefore, the implementation of new tools to simplify the process of database navigation, such as optimized querying and loading strategies, was crucial. Furthermore, careful attention was paid to the user experience. For example, page layout, input methods, responsiveness, and documentation were designed with the end user in mind. The result is an intuitive interface that serves bioinformaticians and novices alike.

A STUDY OF EARLY STAGES IN PROTEIN AGGREGATION

Expery Omollo
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 394
Mentor(s): Lisa Lapidus (PHYSICS-ASTRONOMY)

Previous studies demonstrate that aggregation of Amyloid-beta (Aβ) peptide play a significant role in the development of Alzheimer's disease (AD). In order to treat AD, it is essential to catch the aggregation process in its early stages. This study presents a biophysical approach for detecting aggregation of unfolded Aβ monomer by monitoring its intramolecular loop formation. The mechanism involves introduction of two naturally occurring amino acids, namely tryptophan and cysteine into the Aβ sequence which are used as probes to monitor transient contact formation between them. Tryptophan is used as an

ideal probe because it can be excited to a long-lived triplet energy state upon absorption of 290 nm UV light and its slow decay to a singlet state allows the fast reconfiguration process to be observed by conventional methods. Cysteine, on the other hand, is used as a probe because it is a very efficient quencher and can quench the excited state of tryptophan when nearby, thus shortening the lifetime of the triplet state. We use a bacterial model to produce recombinant Aβ peptides. Tryptophan and cysteine are introduced into the peptide sequence using site directed mutagenesis. The peptide is then expressed, extracted, purified and its purity assessed by SDS-PAGE with silver staining. For the kinetic study, pure peptide is subjected to conditions that favor aggregation and our novel biophysical method keeps track of contact formation between the two probes.

STUDYING THE REGULATION OF GA2OX GENES IN RESPONSE TO PLANT HORMONES AND ABIOTIC STRESS

Jemison Yewah
Biochemistry and Molecular Biology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 395
Mentor(s): Jemison Yewah (BIOCHEMISTRY & MOLECULAR BIOLOGY)

The deactivation pathway for bioactive gibberellins (GAs) is through 2β-hydroxylation by a class of proteins called GA 2-oxidases (Sponsel and Macmillan, 1978; Thomas et al., 1999). These enzymes are encoded by the GA2OX genes. Increasing evidence shows that the expression of GA2OX genes can be regulated to control GA levels in response to other hormonal signals and abiotic stress. However, there is little information about the regulation of specific GA2OX genes and their individual role in GA homeostasis. In this study, we are developing a series of transcriptional and translational reporters for each of the seven GA2OX genes in Arabidopsis thaliana based on the well-known β-glucuronidase (GUS) histochemical system. This will allow us to easily visualize the activity of the promoter in various parts of the plant and in response to hormones and stress, and identify the regulatory regions that are required for the appropriate expression of GA2OX.We also are developing transgenic Arabidopsis lines containing targeted, loss-of-function mutations in each of the GA2OX genes, using the CRISPR-Cas9 system. With the single knockout lines, we will be able to determine the contribution of the specific GA2OX genes to the plant's growth, development, and stress response.

DCAS9-MEDIATED PROMOTER TARGETING OF CTBP TO TEST ITS ACTIVITY IN DROSOPHILA MELANOGASTER

Maddy Niblock
Biochemistry and Molecular Biology, Oral Presentation
Section: 4, 11:00 AM
Presentation Number: 893
Mentor(s): Ana-Maria Raicu (CELL AND MOLECULAR BIOLOGY PROGRAM), David Arnosti (BIOCHEMISTRY & MOLECULAR BIOLOGY)

The C-Terminal Binding Protein, or CtBP, is a conserved transcriptional corepressor protein and dehydrogenase expressed in both humans and in flies. CtBP was first discovered through its interaction with the C terminus of the adenovirus E1A oncoprotein, where it functions as a tumor suppressor. CtBP also binds to the NAD cofactor, which may play a role in its ability to oligomerize or interact with other binding partners. Although CtBP is known to regulate gene expression, it is not completely understood if its dehydrogenase activity plays a role in this regulation. To study CtBP's activity in diverse genomic contexts, we are using molecular cloning techniques to create a fusion protein between a nuclease dead Cas9 enzyme (dCas9) and the Drosophila melanogaster CtBP protein. With the help of gene-specific guide RNAs, dCas9 will recruit the CtBP corepressor anywhere on the Drosophila genome, allowing us to

study its activity in vivo. Specifically, gRNAs will be used to target gene promoters in embryos and in larval imaginal discs to better understand how CtBP functions as a corepressor. In addition to testing wild-type CtBP, we are testing a version of the protein in which its NAD binding domain is mutated (D204N) to test the impact of NAD binding on CtBP's repressive ability. These plasmids will be integrated into the Drosophila genome to produce transgenic lines for comparative analysis in vivo. The results of this study will inform our understanding of CtBP's transcriptional repression activity, and of the potential role of its dehydrogenase activity in repression.

THE EFFECT OF BISPHENOL A ON OOCYTE MATURATION AND DEVELOPMENT

Shannon Doane
Biochemistry and Molecular Biology, Oral Presentation
Section: 4, 11:15 AM
Presentation Number: 894
Mentor(s): Ali Fouladi (EXTERNAL MENTOR)

The purpose of this research experiment was to assess the effects of bisphenol A (BPA) on oocyte maturation and development. BPA is commonly found in plastic bottles, food containers, and canned food liners as plastic softeners. Exposure to BPA can occur through ingestion of food and drink. For this project, bovine oocytes were used as a model for human oocytes and were exposed to different concentrations of BPA. There were five experiments conducted to test the effect of BPA: nuclear maturation to metaphase II, cumulus cell expansion (CCE), TUNEL apoptosis, cleavage rates, and blastocyst formation. For each experiment, there was a control group with no BPA exposure, and 3 treatment groups: 10nM, 100nM, and 100μM BPA. The results showed that the average percentage of oocytes that reached metaphase II in the control was 91.40%±5.46% v. 42.17%±1.92% for the BPA treatment. There was a decrease in CCE in 100μM which was 41.90%±18.00% v. control which was 91.86%± 5.00%. There was a significant difference in the percentage of apoptosis in the control and 10nM groups v. the 100nM and 100μM group ($p<0.001$). Lastly, there was a significant difference in cleavage rates between the control and 100μM group ($p<0.05$), but no difference in the percentage of fertilized oocytes that reached blastocyst formation. The results concluded that BPA does have a negative effect on oocyte maturation and development, but not on blastocyst formation as the results are inconclusive.

THE DEVELOPMENT OF MAGNETOENDOSYMBIONTS FOR MAGNETIC PARTICLE IMAGING, OPTICAL IMAGING, AND THEIR USE FOR EUKARYOTIC CELLULAR CONTROL VIA THERMAL INDUCTION

Melissa Schott
Biochemistry and Molecular Biology, Oral Presentation
Section: 4, 11:30 AM
Presentation Number: 895
Mentor(s): Ashley Makela (INSTITUTE FOR QUANTITATIVE HEALTH), Christopher Contag (BIOMEDICAL ENGINEERING)

Controlling cellular reprogramming is one of the current challenges in the field of biomedical engineering. The ability to treat disease through the external manipulation of cells would contribute tremendously to the improvement of human health. New developments in synthetic biology currently present us with opportunities to control gene expression using inducible plasmid systems in bacteria. The possibility of engineering bacteria, which will live as endosymbionts inside of a eukaryotic host, that could be externally controlled to express transcription factors would allow for the eventual treatment of a variety of human diseases. In the present study we focused on one potential bacterial endosymbiont - Magnetospirillum gryphiswaldense(MSR-1). MSR-1is an aquatic, Gram-negative bacterium which can synthesize its own magnetite crystals inside of organelles called magnetosomes. Using this bacterium as

a magnetoendosymbiont (ME), it is possible to use multiple imaging modalities for in vivomonitoring, such as magnetic particle imaging and optical imaging (i.e. bioluminescence and fluorescence). To achieve this, we propose inserting a plasmid with luminescent and/or fluorescent reporter(s) into MSR-1. Next, a thermally inducible pTlpA system will be introduced into these MEs to harness the potential for thermal regulation by utilizing the magnetosome in conjunction with an alternating magnetic field. The induction of a local temperature increase could regulate the expression of the optical reporter gene(s). If successful, it would be possible to use thermal regulation to control eukaryotic transcription factor(s) that will act on the host cell nucleus and drive eukaryotic cell reprograming.

A FLEXIBLE AND INTERPRETABLE APPROACH FOR IMPUTING THE EXPRESSION OF UNMEASURED GENES

Jake Canfield
Biochemistry and Molecular Biology, Oral Presentation
Section: 4, 11:45 AM
Presentation Number: 896
Mentor(s): Arjun Krishnan (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING)

The ability to integrate many gene expression profiles together across many expression platforms to use in large-scale data-driven models for determining disease mechanisms or suggesting personalized diagnosis is a grand challenge in bioinformatics. Gene expression imputation is an important component of this challenge as it allows a common set of genes across expression profiles without the need for excluding possibly important genes. Current state-of-the-art methods build imputation models that capture gene-gene relationships regardless of the biological context of the expression profile to be imputed. We show that building imputation models that capture sample-sample relationships, that can change for every sample that needs to be imputed, outperform models based on gene relationships. We evaluate imputation models using two machine learning algorithms (LASSO and KNN), for two gene subsets (GPL96-570 and LINCS) and three imputation tasks (Microarray to Microarray, RNA-seq to RNA-seq and RNA-seq to Microarray). We show building LASSO models that capture sample-sample relationships (referred to as SampleLASSO) outperform other methods for all imputation tasks and gene subsets. Additionally, we demonstrate that SampleLASSO does indeed leverage information more readily from training samples of the same tissue type as that of the sample being imputed. These results present a simple, yet powerful way of doing large-scale gene expression imputation.

DELIVERY OF ENGINEERED BACILLUS SUBTILIS TO CANCER CELLS

Olivia Garbacik
Biochemistry and Molecular Biology, Oral Presentation
Section: 4, 12:00 PM
Presentation Number: 897
Mentor(s): Christopher Contag (BIOMEDICAL ENGINEERING), Victoria Toomajian (BIOMEDICAL ENGINEERING)

In 2018, nearly 1.7 million Americans were diagnosed with cancer. There are many existing treatments to combat cancer, but recently a new method has emerged called bacteriotherapy. Bacteriotherapy is the treatment of illness with the use of bacteria and its products. Bacillus subtilis (B.Subtilis) is the bacteria being utilized in this study to explore if proteins or molecules can be secreted to the host cell to cause it to die, with the intent of managing or eradicating the cancer cell. The purpose of this project is to investigate how engineered B. subtilis gets taken up by host cancer cells to allow for the secretion of the proteins or molecules to those host cells. As epithelial cells are capable of phagocytosis of dead mammalian cell products, it is proposed that a cancerous epithelial cell would be capable of taking up the B. subtilis-loaded products of a dead mammalian cell. Specifically, a

mouse monocyte/macrophage cell line, J774A.1, was loaded with the engineered B. subtilis and allowed to incubate until spontaneous cell death, identified by the detachment of cells from the plate and trypan blue staining . Post-cell death, the B. subtilis-loaded dead mammalian cells and their products were introduced to mammary carcinoma epithelial cells (4T1). Uptake of the B.subtilis, via the J774A.1 packages, into the epithelial cells was confirmed through confocal microscopy cross-sectioning.

NOVEL DOMAIN UTILIZATION FOR E2F TARGETING BY THE RBF2 TUMOR SUPPRESSOR IN DROSOPHILA

Jenny Menko

Biochemistry and Molecular Biology, Oral Presentation
Section: 5, 1:30 PM
Presentation Number: 901
Mentor(s): Ronald Henry (BIOCHEMISTRY & MOLECULAR BIOLOGY)

The Retinoblastoma (RB) tumor suppressor system is important for regulating the cell cycle due to interactions with E2F transcription factors that repress gene expression required for cellular proliferation. In human cancer cells, interrupted interactions between RB and its E2F target proteins often occur as a result of mutations, many of which facilitate tumorigenesis. To explore the significance of particular RB domains for gene regulation, we have studied the RB-E2F pathway in Drosophila melanogaster. The RB-E2F pathway is evolutionarily conserved from insects to humans but is streamlined in Drosophila with fewer factors, allowing robust analysis in a genetically tractable model. Drosophila has two RB homologues and two E2F factors called Rbf1, Rbf2, E2F1 and E2F2, respectively. Previous studies showed that Rbf2 has greater specificity than Rbf1 as it only interacts with E2f2, while Rbf1 interacts with both E2f1 and E2f2. We hypothesize that these preferences are critical for tissue-specific gene control and that the differences between the Rbf1 and Rbf2 amino-terminal domains are significant in defining Rbf2 binding affinity. To test this hypothesis, a protein-protein binding assay will be performed to analyze interactions between various Rbf2 domains and its E2f2 partner. In these assays, the binding of untagged "prey" protein domains to tagged and immobilized "bait" protein domains will be examined. Currently, we have optimized the production of Rbf2 and E2f2 domains using an inducible expression system in Escherichia coli. We propose that the Rbf2 and E2f2 interaction outcomes in the Drosophila system will improve our understanding of tumorigenesis in humans.

THE TRANSPORT OF RARE EARTH ELEMENTS IN METHYLOBACTERIUM EXTORQUENS AM1 BY A HIGH-AFFINITY BINDING MOLECULE

Madeline Martin

Biochemistry and Molecular Biology, Oral Presentation
Section: 5, 1:45 PM
Presentation Number: 902
Mentor(s): Norma Martinez Gomez (MICROBIOLOGY & MOLECULAR GENETICS)

Methylobacterium extorquens AM1 mxaF- contains a lanthanide dependent methanol dehydrogenase and must retrieve lanthanides from the surrounding environment for metabolic function. We hypothesize that there is a transport molecule that has a high binding affinity to lanthanides and assists in transporting the highly insoluble metals into the cell for use. The objective of this research is to identify the transport molecule that Methylobacterium extorquens AM1 mxaF- produces to bond to exogenous rare earth elements (REE) and assists in the transport of REE into the cell. Cultures were grown with a NeIII magnet, the cells were harvested, and the supernatant was separated. The supernatant was then passed through amberlite resin solid-phase extraction, then sample fractions were tested using an Arsenazo III (ASIII) assay to see if there is something in the samples that has a higher binding affinity to LaIII than the dye. Samples that indicated that a binding molecule was present were further

processed using size exclusion chromatography and the fractions were evaluated using ASIII assay again. Positive results were further analyzed using HPLC HILIC followed up by ASIII assay then, finally, mass spectrometry. Understanding the mechanisms and components of REE dependent bacterium can lead to the use of these bacteria for recycling REE from electronic waste mitigating additional pollution and decreasing costs of REE.

YEAST-2-HYBRID ANALYSIS OF THE ACT-LIKE DOMAIN OF THE ARABIDOPSIS THALIANA TT8 TRANSCRIPTION FACTOR

Jacqline Njeri
Biochemistry and Molecular Biology, Oral Presentation
Section: 5, 2:00 PM
Presentation Number: 903
Mentor(s): Erich Grotewold (BIOCHEMISTRY & MOLECULAR BIOLOGY)

In maize, R was the first basic-Helix-Loop-Helix (bHLH) protein to be described. The R alleles belong to a small gene family (R/B family), that has been proven to specify anthocyanin pigmentation in tissues of different plants, including maize kernels. The N-terminal region of R contains the R2R3-MYB Interacting Region (MIR), while the C-terminal region harbors the Aspartate kinase, Chorismate mutase, and TyrA (ACT) domain. The ACT domain of R protein has been proven to act as a regulatory switch in the transcription of anthocyanin biosynthetic genes. Previous studies showed that the ACT domain at the C-terminus of R affects DNA-binding of the R bHLH domain. When the ACT domain forms a dimer (ACT-ON), the bHLH is monomeric, and R is tethered to DNA indirectly, through the interaction with C1. When the dimerization of the ACT domain is impaired (ACT-OFF), then the bHLH domain dimerizes, and R recognizes canonical G-box DNA motifs directly through the dimeric bHLH. Although the mechanism of transcription regulation by the ACT domain of R has been well characterized in maize, little is known about the regulation of transcription by the ACT-like domain of bHLH proteins in Arabidopsis thaliana. Arabidopsis genome harbors over 160 bHLH proteins and three bHLH transcription factors such as GLABRA3 (GL3), ENHANCER OF GLABRA3 (EGL3) and Transparent Testa 8 (TT8) are orthologs of R in Arabidopsis. To characterize the ACT domain function in R-like proteins in Arabidopsis, we performed a Y2H analysis assay with the entire C-terminal region of TT8. We also tested the heterodimerization of TT8 with GL3 and EGL3.

CHARACTERIZING PROTEIN STABILITY AND GDP/GTP EXCHANGE RATE OF SELECT GNAO1 MUTATIONS

Josiah Quinn
Biochemistry and Molecular Biology, Oral Presentation
Section: 5, 2:15 PM
Presentation Number: 904
Mentor(s): Richard Neubig (PHARMACOLOGY & TOXICOLOGY), Vincent Shaw (BIOCHEMISTRY & MOLECULAR BIOLOGY)

G protein coupled receptors (GPCRs) are vital to our physiology. Downstream of these receptors are heterotrimeric G proteins, comprised of Ga, Gb, and Gg. GNAO1 encodes Go, a subunit of the heterotrimeric G protein, Go. Abnormal Go variants, such as G40R, V202I, G203R, R209H, and I279N, demonstrate epilepsy and/or movement disorder symptoms in patients. We propose that these mutations induce changes in the GTPase cycle and consequently alter Go influence on downstream effectors. Our aim is to characterize these mutations to reveal the level of impact they have on activity and stability. An RGS-insensitive mutant, G184S, was used as a positive control throughout the study. To date we have characterized two mutations, G203R and R209H. Initially, Differential Scanning Flowcytometry was utilized to examine the thermal stability of each protein in both GDP and GTP-bound states. We found that, in a GDP-bound state, G203R reduced protein stability

while R209H slightly increased it compared to WT. GTP, as expected, stabilized all proteins. However, it did so to different degrees. GTP-bound G203R was substantially less stable than WT, with R209H intermediate to both. Next we subjected the protein to a nucleotide exchange assay to measure the rate at which GDP was released and GTP subsequently bound. Both G203R and R209H dramatically decreased the rate of this exchange compared to WT. These results provide some insight into the biochemical basis of symptom development in certain GNAO1 patients. Performing these assays on the remaining mutations will reveal any deviation from normal they possess.

BUSINESS

WITHDRAWAL: THE EFFECTS OF THE CHINA TARIFFS ON US SUPPLY CHAINS

Caleb Ho, Xinyi Xiang
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 1
Mentor(s): Mei Li (SUPPLY CHAIN MANAGEMENT)

The tariffs resulting from the trade war between China and the United States has given the unique opportunity to see what supply chains companies will fight to keep in China and which they have little issue moving. Though the economic dependence between the two countries seem apparent, just how much and in what ways can be at least partially determined through what products companies prioritize as important to keep in China. These priorities are revealed through the tariff exclusion applications submitted by companies and the change in the imports before and after the tariffs are put in place. Through the tariff exclusion program, companies request a product and possibly all under its HTS code be exempt from the Section 301 tariffs. For each HTS number covered under the tariffs, we can compare them to what is currently being imported from China and sort each into four groups indicating the difficulty of moving each product's supply chain away from China: those that have stopped being imported from China altogether, those that are still being imported yet have not been filed for exemption, those that are being imported and have filed for exemption but have not been approved, and those for whom exclusion has been granted. This way, we found which groups and subgroups of imported goods have been most influenced by the trade war and, by extension, the difficulty of moving their supply chains either in house or to outsource them to another country.

DIVERSITY AMONGST THE FUTURE OF CORPORATE AMERICA: A CRITICAL ANALYSIS OF DIVERSITY KNOWLEDGE AND OPINIONS AMONGST BUSINESS STUDENTS

Janine Thompson
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 2
Mentor(s): Jonelle Roth (MANAGEMENT)

In recent years diversity, equity, and inclusion programs have become warranted throughout corporate America. This is due to the fact that corporations have gained a stronger awareness of the culture they operate in and has also stemmed from discriminatory mistakes being made and the avoidance of mistakes of this nature. The demand for diversity, equity, and inclusion professionals is set to rise exponentially over this decade. With this rise being expected, my research sought to implore the minds of college aged business students who will most likely be filling these roles. My research suggests that while students seem to be favorable toward diversity, most do not have a clear view on what diversity exactly entails or how to go about implementing it in their future work force. It is also reflected in the research

that students tend to be most favorable to racially based diversity and less favorable to age based and less concerned with ageism in the work force. My results institute a framework for the future of corporate America. With these views, it is likely that students will go on to be employed by and or build workforces that are racially and ethnically diverse.

EFFECTS OF PRESIDENT TRUMP'S TWEETS ON THE PERFORMANCE OF A PORTFOLIO OF COMMODITIES

Riley Collins
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 3
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

Over the past two years the US and China have been trying to negotiate favorable trade terms by putting pressure on each other with tariffs. China used to buy 60% of all exports of US soybeans and 20% of all exports of US lean hogs. Since the beginning of the trade war China has stopped importing both US soybeans and lean hogs. We created a mock portfolio consisting of both soybean and lean hog futures contracts in order to see the effects that President Trump's tweets have on futures prices. Through fall 2019, we will be looking at days when our portfolio value varied by more than +/- 15%. We will show that President Trump's tweets have some effect that will vary as the financial market's interpretation of those tweets changes over time.

DOES PRESIDENT TRUMP MANIPULATE THE STOCK MARKET?

Santiago Rodriguez-Papa
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 4
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

The price of stocks in the market is influenced by many diverse forces, ranging from companies' quarterly earnings and annual revenue reports, to general sentiment about the economy and the national and international political climate. In this research, we explore whether the current President of the United States has any effect on stock market prices, and if so, whether this effect could be quantified and exploited. To this end, we created a portfolio of twenty companies, which included steel producers, pharmaceuticals, petrol and gas producers, and media and communicators. The performance of our portfolio tracked over a period of seven months. Our hypothesis is that news related to Trump, his trade war with China, the FTA with Canada and Mexico, his impeachment, et cetera, would correspond to points of interest (peaks and valleys) in the portfolio's performance. These points were studied using a standard event analysis technique: first, the pre-event market risk was determined; then, this market risk was used to calculate the expected return post-event; and finally, the expected return was compared to the actual post-event return to determine whether there was an abnormal return. Overall, we expect to be able to determine whether stock price movements could be anticipated based on the President's actions.

ESTABLISHING RELATIONSHIPS: NAICS CODE REVELATIONS OF SUB-INDUSTRY ANALYSIS

Lydia Whipple
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 5
Mentor(s): Jason Miller (SUPPLY CHAIN MANAGEMENT)

Previous work sought 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. After leveraging a large, underexplored database to delineate the factors that impact buyer power and profitability, a 329 sub-industry report was developed. Utilizing access to NAICS codes, the sub-industry data has been linked to economic data to further develop and solidify findings. The resulting compilation of data employs public and proprietary sources to better understand sub-industry level power dynamics. Through the addition of an external resource, the research can offer deeper insights into how academic theory has made progress and provides practical and applicable value to firms as they navigate the complex and high-stake world of buyer-supplier relationships.

CADILLAC: THE ELECTRIC FUTURE OF AN AMERICAN LUXURY AUTOMAKER

Blake Banas
Business, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 6
Mentor(s): Dante Pirouz (DEPARTMENT OF MARKETING)

The American luxury car brand Cadillac is in the midst of a transformation. As the company refreshes their lineup with stylish SUVs and recalibrates their marketing towards a new audience, Cadillac isn't afraid to redefine itself. With unveiling plans to build all-electric vehicles and introducing self-driving technology, parent company General Motors is looking to Cadillac to become a technology and sales leader. Facing stiff competition in the race towards electrification, Cadillac is working hard to reposition itself in the mind of the customer.

THE SUPPLY CHAIN PROCESS IN HOSPITALITY BUSINESS: WHAT STRATEGIES HELP MAKE A HOTEL SUCCESSFUL?

Sydney Lintol
Business, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 187
Mentor(s): Jeffery Elsworth (THE SCHOOL OF HOSPITALITY BUSINESS)

Have you ever wondered what supply chain strategies make a business run smoothly? We are conducting a data and survey-based research project that explores how specific supply chain management strategies make a hotel efficient and successful. We have created a survey that asks specific criterion-based questions about how different hotel's supply chain processes works. We also are researching the best-used tactics for supply chain through our databases and correlating the surveys with our findings. Research on this topic will help inform us of supply chain strategies as well as help us to draw conclusions as to what makes hotels successful with their purchasing and logistics side of the business.

HOW ACCESSIBLE IS THE INDUSTRY? EXAMINING ACCESSIBILITY IN THE HOSPITALITY INDUSTRY

Jiayu Liu, Kailey Konkle, Kelly O'Brien
Business, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 188
Mentor(s): Mi Ran Kim (THE SCHOOL OF HOSPITALITY BUSINESS)

Hospitality has grown to become one of the largest business sectors in the world, people are interacting with the industry every day. When it comes to the population, 1 in 7 individuals are living their daily lives with a disabling condition. Everyone should be able to have the opportunity to enjoy themselves on vacation, dine at their favorite restaurant comfortably

and board an airplane with ease. This study is to seek out just what the industry was doing to make themselves accessible to the disabled population as well as discover the needs of those with disabilities; what are they looking for to be able to feel welcome?

DOES CORRELATION IMPACT STOCK PORTFOLIO?

Wenyue Cui
Business, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 189
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

Portfolio asset allocation is one of the most common topics discussed in the financial market. The best allocation is certainly one that manages to increase its yield as high as possible while keeping risk as low as possible. So how do we get there? In this study, we allocated a simulated $1M stock portfolio according to negative correlations between companies within the same industry and negative correlations between companies in different industries so as to control the portfolio risk. Our observations, over a period of seven months, will determine whether correlation measurements can be identified as a valuable tool to implement stock portfolio diversification.

OPIOIDS AND THE MARKET

Jack Seck
Business, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 190
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

In light of the opioid epidemic, pharmaceutical companies that produce opioids have been called upon by congress to pay very large settlements to compensate patients. As a result, many companies go near bankrupt, while some split their assets in two in an attempt to protect their non-opioid drug manufacturing endeavours. This research explores how these settlements and newfound legislation affect the opioid manufacturers stock price in comparison with their non-opioid counterparts in the market. The research will provide insight on an investing strategy that focuses on America's number one drug addiction.

MARKETING BUDGET AND STOCK PERFORMANCE

Brett Batten
Business, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 191
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

The objective of this research is to analyze whether there is a relationship between marketing budgets and volatility in stock price. We managed a one million dollar simulated stock portfolio using the StockTrak platform. The portfolio consisted of twenty companies with the largest total marketing budgets per year. These Global 500 companies each spend more than two billion dollars per year on brand management, advertising and mastering the practice of selling more products to more consumers. Data on portfolio risk and return was collected for seven months and compared to the S&P 500. We also analyzed the correlation of daily returns to determine if there was a relationship. We show that our portfolio follows the American stock market index closely but with less volatility. These observations may allow us to conclude that companies that maintain a large marketing budget may contribute to lower stock risk.

SHOULD INVESTORS CONSIDER QUALITY OF LIFE INVESTMENTS?

Sade Omoniyi
Business, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 192
Mentor(s): Antoinette Tessmer (FINANCE)

In many situations, entrepreneurial thinking is not aimed at making social change or improving people's everyday life. Investors usually invest in businesses with a specific goal in mind—to make profit. What if returns could be earned by investing with a mindset utterly consumed by daily life enhancement? This research focuses on whether returns can be earned by investing in businesses whose products are often used daily to improve the quality of life. We invested a simulated $1M stock portfolio in twenty-six companies and tracked the portfolio returns over a period of seven months. We hypothesize that there is a relationship between the level of involvement in regular daily activities and the portfolio returns. Our results will show a sample of companies we might be unconsciously involved with daily, the kind of products they offer and the return earned from those investments. In other words, we analyze the relationship between portfolio returns and incentive to ameliorate life. This will potentially reveal the effectiveness of investing without taking profit into consideration and its implications.

SHOULD INVESTORS PURCHASE INDIVIDUAL STOCKS OR INDEX FUNDS

Nick Balesky
Business, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 193
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

This research project compares the performance and volatility of two stock portfolios. The risk portfolio holds $1M worth of stock investment, distributed among fourteen companies with varying market capitalizations and chosen out of diverse industries. The second portfolio is invested entirely in the S&P 500 index. The goal is to determine if it is more advantageous for an investor to select individual stocks for their portfolio or to invest solely in a market index. If the portfolio contains higher risk, does that increased risk lead to a greater reward? This research may provide insights into whether the extra effort to select individual stocks is worth the returns. Daily percent changes over a period of seven months will be graphed, analyzed, and compared in order to support our conclusion.

AN OVERVIEW OF THE WORLDWIDE ECONOMY

Pedro Puglia
Business, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 355
Mentor(s): Antoinette Tessmer (FINANCE)

This research focuses on the international economy and analyzes how multinational companies based in Europe, Asia and America perform in a global setting. Using a 1-million-dollar simulated portfolio, the capital was invested in companies that represent each of these three regions of the globe. The goal is to see how they are economically connected. This research is relevant once it reveals in numerical and tangible terms how the phenomenon of globalization has impacted the worldwide economy and how financial markets are interconnected. To compare these economies, three different indexes that are relevant to each area were used: The S&P 500, which is an index based in 500 large companies listed on the New York Stock Exchange; The Euro Stoxx 50, which is composed of fifty of the largest

and most liquid stocks traded in the European Union; the Shanghai Composite, which is an index based on all the companies that trade at the Shanghai Stock Exchange.

DOES INVESTING IN CRYPTOCURRENCIES HEDGE AGAINST MORE RATIONAL, RISK-AVERSE INVESTMENT STRATEGIES?

John Biberstein
Business, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 356
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

My research analyzes seven months of data to determine the relationship between cryptocurrencies and rational, risk-averse investment strategies. The $1 million simulated stock portfolio is a collection of five cryptocurrencies, with the remaining funds allocated towards sixteen exchange-traded funds (ETFs) and Fortune 500 stocks, which have shown to provide stable returns in the past. With cryptocurrency being brought to the forefront of the investing world in recent years, it is considered an alternative investment form given its decentralized, public nature through blockchain technology. In times of global and domestic economic uncertainty, the categories of investments have proven to behave in different ways, concluding that a negative correlation exists. Research results offer a unique perspective on how economic environments affect different assets, as well as how effective cryptocurrency is in hedging against standard investments.

AI INVESTING BASED ON PAST STOCK PERFORMANCE: DOES IT WORK?

Abhi Thirupathi
Business, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 357
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

The objective of this research is to verify that the portfolio assembled by AI can beat the S&P 500 returns. To achieve this, stock in ten companies predicted to have a stock price gain of at least 5% by a machine learning model was purchased. The machine learning model was trained with the past stock performance of each company from January 2000 to September 2019. The companies in the portfolio are well-diversified so the only experimental variable is the way the stocks were picked in the portfolio. Returns of the portfolio over six months are compared to the S&P 500 benchmark.

STRIK(E)ING FINDINGS BETWEEN GENERAL MOTORS AND SUPPLIERS

Kendall Carlin
Business, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 358
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

The objective of this research is to analyze whether there is a relationship between the stock market prices of General Motors and fourteen of their suppliers and a specific event that took place in fall 2019. General Motors is a multinational corporation that designs, manufactures, markets, and distributes vehicles. Their suppliers vary in size, from local Michigan businesses to multinational corporations. By investing between $30,000 and $50,000 USD on each company, including General Motors, The Zewig Fund Ing., and Autoliv Inc., we collected data to draw conclusions, no matter the company size. Using the platform StockTrak, we analyze the effects of a particular event on our portfolio over the duration of two semesters. Over the same period, General Motors experienced the longest strike in their history. This event impacted General Motors, but to what extent did it affect its suppliers?

LANSING AND ANN ARBOR, MI: A TALE OF TWO CITIES

Arton Riza, Hailey Kelley, Rebecca Ma

Business, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 359
Mentor(s): Michael Adetayo Olabisi (AGRICULTURAL, FOOD, AND RESOURCE ECONOMICS)

Through our research, we have chosen to inspect how the presence, or lack thereof, of manufacturing employment, has caused these two vital Michigan cities to develop into two distinctly unique and separate places. We will use economic data to model how manufacturing has altered the development of these two cities and additionally how it affects their futures.

INVESTIGATING CONSUMER RESPONSE TO STOCKOUT RECOVERY SERVICE DESIGNS IN AN OMNI-CHANNEL RETAIL ENVIRONMENT

Jake Marciniak

Business, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 360
Mentor(s): Simone Theresa Peinkofer (SUPPLY CHAIN MANAGEMENT)

Stockouts represent a persistent operational challenge for retail supply chains, often negatively impacting manufacturers, retailers, and consumers. The significance of the stockout issue has caused retailers to focus on both upstream and downstream supply chain operations to mitigate the adverse consequences of stockouts. Retailers are increasingly leveraging their integrated retail operations networks to access available inventories across multiple channels to "save the sale" from a stockout situation. The purpose of this research, therefore, is to investigate how consumers respond to stockout recovery service designs in an omni-channel retail operations environment. Thus, this research explores the effectiveness of various stockout recovery scenarios and provides an in-depth investigation at the service recovery paradox. Results from a series of scenario-based and laboratory experiments show the nuanced impact contextual factors such as price promotion, shopping context, and shipping cost will have on the effectiveness of stockout recovery efforts.

COMMUNITY ENGAGEMENT IN THE RESTAURANT INDUSTRY: EXPLORING THEMES, STRATEGIES AND PRACTICES

Jared Chick, Katie Harding

Business, Oral Presentation
Section: 4, 8:30 AM
Presentation Number: 807
Mentor(s): JaeMin Cha (THE SCHOOL OF HOSPITALITY BUSINESS), Seung Kim (THE SCHOOL OF HOSPITALITY BUSINESS)

Consumers are increasingly expecting companies to engage in responsible business practices that positively impact society as a whole. Community engagement is one of the important pillars under corporate social responsibility (CSR) and is evolving in a way that is generating promising outcomes for hospitality companies. Community engagement, commonly defined as the collaborative process or strategies aimed at tackling topics that matter to a large number of people, both from within the company and community. The restaurant industry is especially actively involved with community engagement as a way to enhance customer-based brand equity, increase brand awareness and improve brand reputation. However, research on CSR is limited in hospitality literature, especially in the restaurant sector concerning community engagement. Using research found from other literatures, this study aims to further define community engagement and pinpoint what these strategies mean to

customers. We propose to conduct a systematic review of community engagement literatures published in top hospitality and tourism journals, use content analysis by evaluating various themes of community engagement activities and practices in the top 20 U.S. restaurants (identified by Nation's Restaurant News). We also propose to adopt a case study focusing on HopCat's community engagement activity.

THE IMPACT OF SOCIAL MEDIA INFLUENCERS ON CONSUMER DECISIONS IN THE HOSPITALITY INDUSTRY

Byrdie Thagard, Jake Siegel, Mackenzie Newman
Business, Oral Presentation
Section: 4, 8:45 AM
Presentation Number: 808
Mentor(s): JaeMin Cha (THE SCHOOL OF HOSPITALITY BUSINESS)

Influencer marketing is an increasing marketing tactic in the hospitality industry to achieve more recognition and powerful relationships between consumers and brands. Social media influencers, also known as "Internet celebrities", use social media to promote a certain lifestyle. Influencers are paid to post on media platforms such as Instagram, Facebook, Snapchat, and more. Consumers can view short glimpses of influencers' everyday lives on these platforms through pictures and videos, emotionally connecting consumers to the brand they are promoting. In the hospitality industry, using social media influencers as a marketing tactic is becoming an important strategy to compete against industry disruptors and top competitors. A literature review highlights rising groups of social media influencers in the hospitality industry and how they are changing consumer buying behaviors. Given the prevalence of social media usage in the hospitality industry, the purpose of this research is to examine the impact of social media influencers and their effect on emotional connection, brand engagement, and hospitality purchasing decisions amongst different age demographics. Research will be conducted by using online surveys. Hospitality operators will be interviewed on understanding the opportunities and threats of incorporating social media influencers in the market. The findings of our research intend to advance our knowledge on the importance of social media influencers in the hospitality industry.

THE PERCEPTIONS OF GENDER EQUALITY IN THE HOSPITALITY INDUSTRY FROM THE PERSPECTIVE OF EARLY CAREER EMPLOYEES

Jiayu Liu, Kailey Konkle, Kelly O'Brien
Business, Oral Presentation
Section: 4, 9:00 AM
Presentation Number: 809
Mentor(s): Mi Ran Kim (THE SCHOOL OF HOSPITALITY BUSINESS)

Women make up over 60% of employees, students, and the decisions within the hospitality industry but somehow only hold 5% of the CEO positions. Gender equality has been a looming issue for decades, how prevalent is it for those who are fresh into their careers? Using an online survey this study sought out to explore the thoughts and opinions of recent hospitality program graduates.

SUPPLYING THE RESULTS OF A STOCK PORTFOLIO SIMULATION

Alec Woodman, Conner Pinkham, Kendall Carlin
Business, Oral Presentation
Section: 4, 9:15 AM
Presentation Number: 810
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

Supply chain management refers to the process of moving goods and materials from suppliers, through production, and finally to the consumers. Manufacturing companies rely on

suppliers for resources to produce a final good. This research project aims to investigate the relationship between the stock price of a manufacturing company and of its suppliers. We back our analysis on 7 month stock performance through Stocktrak, a global portfolio simulation platform. We researched four larger companies, Apple, Tesla, General Motors and Intel, and the respective suppliers. This research hopes to find a relationship and use that relationship to make rational decisions in the future when investing in the stock market. Our results will provide potential insight on a stock investment strategy relying on rational suppliers vs manufacturer selection. We hypothesize that market movements in the manufacturing company stock are leading stock price movements of its suppliers and vice versa.

BREXIT LEGISLATIONS IMPACT ON FINANCIAL MARKETS

Amara Hackett
Business, Oral Presentation
Section: 4, 9:30 AM
Presentation Number: 811
Mentor(s): Antoinette Tessmer (FINANCE), Kirt Butler (FINANCE)

The objective of this research is to analyze whether there is a relationship between a portfolio of twenty specific United Kingdom and European companies and Brexit related events with an emphasis on companies whose key operations will potentially be impacted by Brexit. To reduce the portfolios systematic risk, we diversified our investments among different industries such as airlines, financial services, automotive, real estate, retail, pharmaceutical, chemical/oil/gas, and food and drink. An event analysis will be conducted on multiple dates, which are assumed to have a significant impact on the Brexit process. Using specific financial formulas, a pre-event "training period" will be used to describe our portfolio's normal behavior which will then be compared to post-event actual portfolio returns. A relationship between these events and the portfolio returns will be observed. This research will determine whether a diversified portfolio's behavior can be attributed to the selected events. Our conclusions may provide insights into a portfolio management strategy that would depend on major European political events.

GLOBAL EVENT TRENDS: HOW HOTEL VENUES CAN GET AHEAD

Sarah Michelson
Business, Oral Presentation
Section: 4, 9:45 AM
Presentation Number: 812
Mentor(s): Bonnie Knutson (THE SCHOOL OF HOSPITALITY BUSINESS)

Expectations from conference attendees are rising and planners are struggling to keep up, turning to their host hotels for creative, engaging ideas. This research has focused on solutions that can be implemented both short-term and long-term by hotels to deliver on the expectations and needs of both event planners and their attendees, and to set themselves apart in the future venue selection process. A broad variety of solutions have been identified utilizing an assortment of sources, including industry and global trend reports.

A SHOPPER'S JOURNEY

Mary Tuski
Business, Oral Presentation
Section: 4, 10:00 AM
Presentation Number: 813
Mentor(s): Bridget Behe (HORTICULTURE), Lynnell Sage (HORTICULTURE), Patricia Huddleston (ADVERTISING AND PUBLIC RELATIONS)

A Shopper's Journey is an exploratory study to understand the behavioral, cognitive, and reasoning processes customers use to select plant material. Four greenhouses in the Kalamazoo and Metro-Detroit areas were enlisted to participate in the study; customers were invited to participate in the study through email. After informed consent, we used Tobii eye-tracking glasses to record eye movement during their 12-15 minute shopping experience to purchase a $10 plant. Approximately 40 participants per greenhouse agreed to participate in the study which yielded 154 useful videos. The videos were analyzed to identify significant events (e.g. reading a sign with or without price, picking up a plant, using their cell phone, etc.) to determine shopper activities during their retail shopping experience. Time spent in certain areas of the store (e.g. annuals, perennials, shrubs, etc.) were also coded as events. We found the most frequent event was looking at or touching a plant, which participants did, on average, 14.5 times during their trip. Participants read, on average, 13.1 signs with price and 6.7 signs without price during their shopping trip. Results provide direction for future studies. This exploratory study is one to blaze the path for future studies on understanding the shopper's perspective, behavior, and reasoning while determining what plant to buy.

CELL BIOLOGY, GENETICS, & GENOMICS

DSP LOSS VIA ZEB IN HUMAN CANCERS

Sean Foster

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 99
Mentor(s): Christina Chan (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Kevin Chen (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

The elevated uptake of the saturated fatty acid palmitate is associated with the progression of metastasis in cancer cells. Scratch assays of colon cancer cells (HCT 116) show that palmitate is also associated with an increase in migration of the colon cancer cells. Although palmitate is associated with the metastatic progression of cancer cells, the signaling mechanism for this is unclear. The loss of cell adhesion proteins like desmoplakin (DSP) is an important part of the transformation of cancer cells to more aggressive phenotypes. We found with breast cancer cells that comparing IRE1 knockdown to wildtype (WT) cancer cells, the cells without IRE1 showed reduced expression of DSP and cell migration as compared to WT upon culture with palmitate. We will present preliminary results showing that palmitate activates IRE1-XBP1 (inositol-requiring enzyme 1 α - X-box binding protein 1) of the endoplasmic reticulum (ER) stress pathway to promote colon cancer migration.

USING THREE-DIMENSIONAL IMAGING TO EXAMINE THYMIC EPITHELIAL CELL CHANGES DURING PREGNANCY

Lindsey Royer

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 100
Mentor(s): Margaret Petroff (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION), Ripla Arora (OBSTETRICS, GYNECOLOGY & REPRODUCTIVE BIOLOGY), Soo Hyun Ahn (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

A semi-allogeneic fetus is genetically composed of both maternal and paternal antigens and thus can trigger an immune response from the mother during pregnancy. To prevent the maternal immune system from attacking the embryo, immune functions are adapted to avoid fetal rejection while still providing immunity to the mother against infections. The thymus is the lymphoid organ responsible for T lymphocyte development and is composed of outer

cortex and inner medulla. The outer cortical layer of the thymus, which can be visualized with the protein Cytokeratin 8, or CK8, is responsible for T cell proliferation and acquisition of functional antigen receptors, while the inner medullary region, visualized with protein Cytokeratin 5, or CK5, tests maturing T cells for self-reactivity. During pregnancy, high levels of progesterone and estradiol from the ovary and placenta cause the thymus to diminish in size and cellularity. Less is known about what regions of the thymus change and what cell types are affected. The aim of this project is to use confocal microscopy followed by image analysis to develop a reliable imaging technique that can quantify observable pregnancy-related changes in the thymus in three dimensions. We used the non-pregnant and pregnant (gestation day 14.5) murine thymus to conduct spatial analysis in three dimensions after staining with CK5, CK8, as well as the nuclear marker DAPI. This will allow us to start answering questions pertaining to pregnancy-associated thymic reduction and to further evaluate the complex changes in the maternal immune system during pregnancy.

POINT MUTATIONS IN THE GENE ENCODING ELONGATION FACTOR G CONFER ANTIBIOTIC RESISTANCE IN THE BACTERIAL PATHOGEN PSEUDOMONAS AERUGINOSA

Michael Rose

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 101
Mentor(s): Christopher Waters (MICROBIOLOGY & MOLECULAR GENETICS)

Pseudomonas aeruginosa is a bacterial pathogen that is capable of surviving in medical equipment by forming biofilms. It primarily infects open wounds and airways of immunocompromised patients and is responsible for a significant number of deaths in patients with cystic fibrosis. Antibiotic treatment is commonly used to treat P. aeruginosa infections, but many strains develop resistance to the most effective antibiotics. Previous research has shown that treating P. aeruginosa biofilms with triclosan in combination with tobramycin, an aminoglycoside that is commonly used to treat P. aeruginosa infections, is more effective at inhibiting the pathogen than tobramycin treatment alone. To study the impact that genetic mutations have in conferring resistance to this drug combination, our lab exposed P. aeruginosa biofilms to increasing concentrations of the antibiotic combination to select for mutations that favor resistance. By comparing the genomes of these strains, it was found that the gene fusA1 was a common site for mutations. This gene encodes the elongation factor-G (EFG) protein which tRNA translocation and ribosomal separation during translation. To analyze the impact of these mutations, the mutations of the gene are transformed into the laboratory PAO1 strain of Pseudomonas aeruginosa using the gateway cloning vector pDONRPEX18gm. As well as testing the impact of the mutation in PAO1, the fusA1 mutations have been cloned into pEVS143 plasmids to test the impact of expressing mutant EFG on laboratory Escherichia coli on antibiotic resistance.

EXAMINING A POTENTIAL THERAPEUTIC APPROACH FOR LUNG SQUAMOUS CARCINOMA: TARGETING MAPK SIGNALING PATHWAYS

Madeleine Batra

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 102
Mentor(s): Kathleen Gallo (PHYSIOLOGY)

Lung cancer research is extremely important because lung cancer is the leading cause of cancer death worldwide for men and women. Non-small cell lung cancer (NSCLC) is the most common type of lung cancer and can be divided into two main subcategories: adenocarcinoma and squamous cell carcinoma. Recently developed therapies for adenocarcinoma are now leading to increased survival rates, whereas new effective therapies

for lung squamous cancer are still needed. Lung squamous cell carcinoma is globally responsible for 400,000 deaths, annually. The main treatments for squamous cell carcinoma are cytotoxic chemotherapy and radiation treatment so this study examines potential new therapies. The mitogen-activated protein kinase (MAPK) pathway, which is important for growth and proliferation among other cellular functions, is focused on in this study, specifically the mixed lineage kinase (MLK) subfamily of MAP3Ks. MLK family members are overexpressed and/or amplified in 70% of squamous cell lung cancers according to The Cancer Genome Atlas, so this study assesses the effects of a pan MLK inhibitor on human lung squamous cancer cells. Western blotting and viability and proliferation assays will be used with the goal of determining the role of MLKs in MAPK signaling in lung squamous cells and the ability of an MLK inhibitor to affect cell viability and proliferation. Western blotting can assess the effect of the pan MLK inhibitor on MAPK signaling while viability and proliferation assays can determine the effect that an MLK inhibitor has on cell growth and proliferation.

BIOENGINEERING HUMAN EPICARDIAL ADIPOSE TISSUE FROM PLURIPOTENT STEM CELLS (PSCS) FOR THE STUDY OF CARDIOVASCULAR AND METABOLIC DISEASE

Amanda Huang
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 103
Mentor(s): Aitor Aguirre (BIOMEDICAL ENGINEERING)

The human heart is surrounded by a large external layer of brown fat-like tissue known as epicardial adipose tissue (EAT). EAT is an important modulator of cardiac function by controlling lipid availability to heart cells, providing homeostatic and metabolic biochemical signals, and regulating temperature. Expansion and dysfunction of this tissue also strongly correlates with coronary artery disease and diabetic cardiomyopathy. However, the biology of EAT is poorly understood because common model organisms for cardiovascular studies, such as mice, lack this tissue. Evidence suggests EAT is derived from the epicardium during development. Leveraging on a recent protocol for the robust production of epicardial cells from human pluripotent stem cells, our objective was to create PSC-derived human EAT from epicardial progenitors for the study of cardiovascular and metabolic disorders. Activation of peroxisome proliferator-activated receptor gamma (PPARγ) is required for epicardial cell fate-switch into EAT. We designed and tested different combinations of small molecule cocktails including varying concentrations of rosiglitazone, isobutyl methylxanthine (IBMX), and dexamethasone to evaluate their capacity to activate PPARγ and induce adipocyte fate. Successful conversion into adipocyte fate was evaluated by Oil Red O staining for lipids, qRT-PCR for brown fat and adipocyte markers, and immunofluorescent staining. Our findings indicate that the mixture we created was successful at inducing adipocyte formation. Future work includes further protocol optimization and RNA-seq analysis to compare PSC-derived EAT to its human and pig biopsies. Our protocol will pave the way to understand the role of human EAT in normal biology and disease.

DEMONSTRATING AND DISRUPTING THE INFLAMMATORY RESPONSE IN KRAS-MUTANT LUNG CANCER

Ishaan Modi
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 104
Mentor(s): Hayden Stoub (LYMAN BRIGGS COLLEGE), Kathleen Gallo (PHYSIOLOGY)

Adenocarcinoma is the main type of non-small cell lung cancer (NSCLC), constituting the vast majority of cases of lung cancer. In approximately 30% of these lung adenocarcinomas, an

oncogenic mutation of the gene KRAS is responsible. Unfortunately, KRAS-mutant lung adenocarcinomas have been an evasive target, with limited effectiveness of chemotherapy and targeted treatments. With individuals suffering from KRAS-mutant adenocarcinomas having a two-year shorter median survival, new approaches must be considered. A potential area of attack is through interrupting tumor-macrophage crosstalk, for it is now appreciated that KRAS can drive pro-tumorigenic inflammation. Our lab has established that macrophage exposure to tumor-conditioned media induces considerable increases in cytokine mRNA production, a hallmark of the inflammatory response. Previous inquiry has suggested the anti-inflammatory effect of MLK inhibitors in the context of a macrophage model. In this project, we are testing the impact of MLK inhibitors in macrophages immersed in a KRAS-mutant lung tumor microenvironment. Macrophages will be stimulated with conditioned medium derived from human KRAS-mutant lung cancer cell lines in the presence and absence of an MLK inhibitor. Inflammatory cytokine expression will be assessed by qPCR of mRNA isolated from these macrophages. This presentation maintains that if drug treatment yields promising results in our model, it opens up a new way to examine and confront cases of KRAS-mutant lung cancer.

GENETIC MODELS OF PANCREATIC CANCER UNCOVER TUMOR SUPPRESSIVE ROLE OF MICRORNA-21

Katie Powell
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 105
Mentor(s): Lorenzo Sempere (RADIOLOGY)

Pancreatic ductal adenocarcinoma (PDAC) is a recalcitrant and lethal disease with an overall 5-year survival rate of less than 8%. PDAC is characterized by its highly aggressive cancer cells and extensive stroma reaction. This reactive stroma contains distinct tumor-restraining and tumor-promoting fibroblast subpopulations. Re-education rather than indiscriminate elimination of these fibroblasts has emerged as a new strategy for combination therapy. We studied the effects of global loss of pro-fibrotic non-coding regulatory microRNA-21 (miR-21) in K-Ras-driven p53-deleted genetically engineered mouse models of PDAC. Strikingly, loss of miR-21 accelerated tumor initiation and progression to locally advanced invasive carcinoma from which animals precipitously succumbed at an early age. The absence of tumor-restraining myofibroblasts and a massive infiltrate of immune cells were salient phenotypic features of global miR-21 loss. Stromal miR-21 activity was required for induction of tumor-restraining myofibroblasts in in-vivo isograft transplantation experiments. Low miR-21 expression negatively correlated with a fibroblast gene expression signature and positively with an immune cell gene expression signature in TCGA PDAC data set (n = 156) mirroring findings in the mouse models. Our results exposed an overall tumor suppressive function of miR-21 in in-vivo PDAC models. These results have important clinical implications for anti-miR-21-based inhibitory therapeutic approaches under consideration for PDAC and other cancer types. Mechanistic dissection of the cell-intrinsic role of miR-21 in cancer-associated fibroblasts and other cell types will be needed to inform best strategies for pharmacological modulation of miR-21 activity in PDAC in order to remodel the tumor microenvironment and enhance treatment response.

COMPUTATIONAL APPROACH FOR PROTEIN TARGET IDENTIFICATION

Lauren Sosinski
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 267
Mentor(s): Janani Ravi (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

Computational tools are critical for genetic and genomic research; they allow for faster analyses and annotations of genomes as well as identification of specific gene targets. However, currently there is no process for identifying and characterizing target proteins based on their genetic sequence. To develop this workflow, Nontuberculous Mycobacteria (NTM) were chosen as a test case. Diagnostic targets for members of this genus were determine due to the organisms' detrimental effects on the agriculture community and their ability to become opportunistic pathogens in humans. In both cases, no efficient and cost-effective diagnostic tests exist. Predicting proteins for clinical tests will allow us to develop the workflow before generalizing the program for other uses. We began by characterizing known virulence factors (VF) in NTM, then determining homologs in pathogenic and nonpathogenic Mycobacteria via BLAST tools. This allows us to exclude proteins that exist in nonpathogenic bacteria, as they don't contribute to the pathogenicity of the organism. Next, using RPSBLAST and InterProScan, domain architecture, secondary structure, and localization were determined. Protein structure and function are crucial for determination of targets useful for diagnostic testing, such as secreted or extracellular proteins. Additionally, genomic context was determined using these tools to figure out whether or not it's expressed within the organism and part of certain cellular processes. This workflow will allow for the determination of useful target proteins, which can then be verified experimentally. Not only will it be useful for predicting diagnostic targets, but it will have the potential to be used in potential vaccine and treatment target identifications.

IDENTIFYING MECHANISMS OF PHAGE DEFENSE IN A GENOMIC ISLAND OF VIBRIO CHOLERAE

Drew Beckman
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 268
Mentor(s): Christopher Waters (MICROBIOLOGY & MOLECULAR GENETICS)

Our research centers on understanding how the pathogenic El Tor strain of Vibrio cholerae defends itself against bacteriophage infection. One unique characteristic of this strain is the presence of two genomic islands called VSP-I and VSP-II, thought to be responsible for phage defense. To determine which genes were responsible for phage defense, we generated mutants of V. cholerae with transposons interrupting each individual gene on the VSP-I genetic island in a genetic background in which the entire VSP-II island was deleted. The presence of the transposon was confirmed by comparing the lengths of DNA PCR products (wild type vs. mutants) using gel electrophoresis. We have generated 11 transposon mutants in VSP-I genes. Each individual mutant is being tested for its contribution towards resistance to ICP-3 phage, one of the 3 major lytic phage of V. cholerae. After the first round of experiments, it was discovered that our transposon in gene VC0175 exhibited complete resistance to phage infection. The wild type and mutant of only the VSP-II island were susceptible at most concentrations of phage tested. To confirm these results, a mutant with a clean deletion of VC0175 was generated and examined for phage infection. This mutant was even more susceptible to phage infection than its wild type counterpart when VC0175 was not present, suggesting that the transposon insertion mutant had required a novel mutation leading to resistance. Future research will explore this resistance as well as the role of the other VSP-I genes in phage defense.

A COMPUTATIONAL APPROACH TO IDENTIFY UNIQUE PATHOGENIC SRNA SIGNATURES IN DOMESTIC AND WILD HOSTS

Philip Calhoun
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 269

Mentor(s): Janani Ravi (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

Early diagnosis of many agriculturally relevant zoonotic diseases has always been problematic since the hosts often remain asymptomatic until it's too late. The second main problem has been with accurate and sensitive diagnosis often confounded by closely-related and environmental bacteria. We, therefore, focus on developing a computational workflow to identify pathogen-specific diagnostic targets, that can be detected in infected hosts. Small RNA (sRNA) is a class of RNA that is used regularly in cellular housekeeping, and is critical for gene regulation in immunological and developmental contexts. Upon infection, changes could occur in both host and bacterial sRNA. We are interested in identifying bacterial sRNA that are pathogen-specific, making them excellent candidates for diagnostic biomarkers. Although intra-and extra-cellular sRNA have been used extensively in cancer detection (host miRNA), few studies have addressed sRNA as biomarkers for detecting pathogens within the host. Here, we propose computational approaches to detect pathogenic sRNA in infected host samples. In order to test the workflow, we use a recently published dataset with Mycobacterium avium paratuberculosis infecting Bos taurus (GSE129819) to identify unique pathogenic sRNA. We will use existing sRNA databases, host and pathogen reference genomes, and literature surveys to help us discern uniquely bacterial sRNA that can be isolated and detected in infected host samples. Next, we will use de novo approaches to predict novel pathogenic sRNA. Taken together, our approach will help us identify sRNA signatures unique to pathogens within infected hosts, and facilitate early diagnosis of bacteremia.

WHOLE GENOME SEQUENCING DATA INVESTIGATION OF OLD ENGLISH SHEEPDOGS WITH PROGRESSIVE RETINAL ATROPHY CANDIDATE GENES

Amanda Liddicoat

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 270
Mentor(s): Paige Smith (SMALL ANIMAL CLINICAL SCIENCES), Simon Petersen-Jones (SMALL ANIMAL CLINICAL SCIENCES)

Progressive retinal atrophy (PRA) is a broad term describing hereditary bilateral retinal degenerations. The autosomal recessive PRA seen in Old English Sheepdogs (OES) is a rod cell led degeneration presenting with night blindness that advances to total blindness as cone cells subsequently deteriorate. PRA has been described in over 100 dog breeds and while 24 PRA-causing mutations in 18 genes have been identified, the causative variant in OES is unknown. The aim of this project was to identify the causal variant for PRA in OES using whole genome sequencing (WGS) data. Our hypothesis was that a unique single variant is responsible for the diagnosed PRA in the affected dogs. The PCR-free paired-end WGS data obtained from 2 PRA-affected and 2 control OES was sequenced to a depth of ~30X coverage of the genome. After trimming, the reads were aligned to a reference genome and variants from each OES genome were called resulting in over 5,000,000 variants per dog. Variants within a list of PRA candidate genes were selected that were homozygous in at least one affected OES and homozygous in zero controls (OES controls plus 54 additional control dogs). After filtering, 415 variants remained for further investigation. Variants were confirmed via Sanger sequencing. True positive variants were investigated for predicted impact on protein structure or function and tested in additional OES samples. Identification of the mutation that results in PRA in OES will allow breeders to make informed breeding decisions and eliminate the condition from the breed.

MRNA BINDING PROTEINS ASSOCIATED WITH MOUSE OOCYTE QUALITY

Elizabeth Kelly

Cell Biology, Genetics, and Genomics, Poster Presentation

Section: 2, 11:00 - 12:30 PM
Presentation Number: 271
Mentor(s): Keith Latham (ANIMAL SCIENCE), Meghan Ruebel (ANIMAL SCIENCE), Peter Schall (VETERINARY MEDICINE)

Understanding determinants of oocyte quality will improve our understanding of oogenesis and early embryogenesis, as well as revealing possible approaches to treat infertility. In mice, F1 hybrid oocytes (e.g., C57BL/6 X DBA/2) display superior oocyte quality as compared to the parental strains. This laboratory recently completed a transcriptome analysis of immature and mature oocytes for these genotypes. An examination of RNA binding protein mRNA expression revealed that the mRNA encoding Fused in sarcoma (FUS) is highly abundant. FUS is a component of paraspeckles, a special structure in nuclei related to stress response. Additionally, FUS has roles in DNA repair, mRNA processing, and mRNA translation. Through immunofluorescence confocal microscopy, we observed nuclear FUS expression at the germinal vesical stage. FUS was not seen in early cleaving embryos, but reappeared in nuclei by the blastocyst stage. In the germinal vesicle, FUS is not associated with paraspeckles, indicating a different function at that stage. Current work is using a bioinformatics approach to assess roles of FUS in oocyte mRNA regulation during maturation. The work in the author's laboratory is supported in part by grants from the National Institutes of Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development (RO1 HD075903 and T32HD087166), MSU AgBioResearch, and Michigan State University.

PRINCIPLES OF MOUSE BONE RNA ISOLATION AND ANALYSIS USING REAL TIME-QUANTITATIVE PCR

Morgan Roegner
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 272
Mentor(s): Laura McCabe (PHYSIOLOGY), Narayanan Parameswaran (HUMAN MEDICINE)

To produce proteins, a cell transcribes sequences of DNA code in the nucleus into messenger (m)RNA which then gets translated into proteins. My research is focused on understanding the isolation and analysis of mRNAs associated with bone health. I extracted total RNA from frozen mouse tibial bone using trizol reagent which lyses cells and stabilizes RNA. I then spectrometrically measured RNA samples at 260 and 280 nanometer wavelengths to assess RNA concentration and purity of the samples. Using formaldehyde gel electrophoresis and ethidium bromide staining, the integrity of the RNA samples was confirmed based on visualization of 18s and 28s ribosomal RNA bands. Next, the RNA was reverse transcribed to make cDNA for quantitative polymerase chain reaction (RT-qPCR). The qPCR determines levels of mRNAs which relate to gene expression. The data is analyzed by the comparative CT method, 2-ΔΔCT, where delta represents the change between the level of the gene of interest and the housekeeping gene, hypoxanthine-guanine phosphoribosyltransferase (HPRT), which does not change between conditions. The genes of interest that I am examining include: a pro-inflammatory cytokine (Tumor necrosis factor-α, TNF-α) and an anti-inflammatory cytokine (Interleukin 10, IL-10). This will allow me to assess if our treatments (glucocorticoids and probiotics) affect inflammatory responses and if these are related to bone health.

VARIANT ANALYSIS OF GERIATRIC ONSET LARYNGEAL PARALYSIS AND POLYNEUROPATHY IN THE NEWFOUNDLAND DOG

Rebecca Ross
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 273

Mentor(s): Bryden Stanley (SMALL ANIMAL CLINICAL SCIENCES), Paige Smith (SMALL ANIMAL CLINICAL SCIENCES), Simon Petersen-Jones (SMALL ANIMAL CLINICAL SCIENCES)

Geriatric Onset Laryngeal Paralysis Polyneuropathy (GOLPP) is a late-onset neurodegenerative condition of large-breed dogs with similarities to the human disorders Amyotrophic Lateral Sclerosis (ALS) and Charcot-Marie-Tooth Disease (CMT). It initially presents as a flaccid paralysis of the larynx with resultant respiratory compromise, and upper esophageal dysfunction. With progression, a more generalized paralysis initially involving the hind limbs. The aim of this project is to use whole genome sequencing (WGS) to identify the DNA variant(s) that result in GOLPP in the Newfoundland dog breed. Our hypothesis is a single mutation, that is associated with neurological deterioration, is responsible for GOLPP. Mutations displaying any type of segregation pattern are being investigated because the inheritance pattern of GOLPP is unknown. Five control samples and ten affected Newfoundland samples (N=15) were prepared for 30x coverage WGS using PCR-free techniques. The data output from WGS for each sample was trimmed, aligned to a reference genome, and analyzed based on identified variants. Variants identified through WGS analysis were screened through a list of 89 genes associated with ALS and CMT. Variants of interest based on candidate gene screening were investigated through PCR amplification and Sanger sequencing. Identification of the causal gene mutation for GOLPP will allow for informed breeding decisions to be made to reduce or eliminate GOLPP in the Newfoundland breed. Additionally, an interesting therapeutic model to help future GOLPP dogs and humans with similar neurodegenerative diseases has the potential to stem from this work.

DEVELOPMENT OF FULL MULTIPLEX ON BOVINE DNA TO ALLOW DIFFERENTIATION OF INDIVIDUALS IN MIXED SAMPLES

Maddy Eischer

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 453
Mentor(s): Patrick Venta (MICROBIOLOGY & MOLECULAR GENETICS)

With cattle being a staple of human agriculture, analysis of the cow genome has become just as important as analysis of the human genome. Current projects mostly entail using single nucleotide polymorphisms (SNPs) to detect genetic variation between individuals, and while this method has been proven effective, it carries the burden of being expensive and time consuming. To combat this problem, our research has focused on creating a cheaper, one-step multiplex of hexaSTR, pentaSTR, and tetraSTR primers to detect genetic variation in cows. Through experiments involving DNA extraction from steak samples, PCR with multiplex mixtures, and analysis through gel electrophoresis, a 10-primer multiplex has successfully been created. For countries and individual cow farmers that do not have access to the resources and funds needed to perform SNP analysis, the success of our multiplexing project will prove a great benefit. Additionally, we hypothesized that this multiplex would be useful in detecting individuals in mixed samples, and upon combination of different concentrations of cow DNA samples and execution of experiments as mentioned above, this multiplex has been successful in differentiating between individuals. This aspect of our research has the potential to be used by government organizations in the event of salmonella contamination or other outbreaks within mixed samples (i.e. ground beef) to determine which individual cows were to blame for the outbreak. Future experiments will entail trial of new primers to create a larger multiplex and investigation into the minimum concentration of DNA needed to be detected in a mixed sample.

DIURNAL INTRAOCULAR PRESSURES (IOPS) IN NORMAL DOGS AND DOGS WITH ADAMTS10-OPEN-ANGLE GLAUCOMA (ADAMTS10-OAG)

Vanessa Raphtis

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 454
Mentor(s): Andras Komaromy (SMALL ANIMAL CLINICAL SCIENCES)

Glaucoma is a leading cause of incurable blindness affecting the optic nerve. The most common form is open-angle glaucoma (OAG). Elevation of intraocular pressure (IOP) is a major risk factor. At the Michigan State University College of Veterinary Medicine, we house a unique, well-established and clinically relevant large animal model: dogs with OAG due to a G66IR missensemutation in the ADAMTS10 gene. The purpose of this study was to perform a large-scale diurnal IOP screening in dogs with ADAMTS10-OAG as a function of age/disease stage and compare the findings with those of normal control dogs. Diurnal (8am, 11:30am, 3:30pm) IOP measurements (via tonometry) were performed over a 7-year period on 37 ADAMTS10-OAG and 31 unaffected control dogs between the ages of 2 weeks and 7 years. Changes of diurnal and average daily IOPs were evaluated as a function of age by linear mixed models ANOVA, followed by pairwise comparison of consecutive means. In contrast to normal dogs with no major age and diurnal effects, there was a significant gradual, age-related IOP increase in ADAMTS10-OAG dogs (LS mean +/- SEM): year1=19.0+/-0.6, year2=21.2+/-0.7, year3=23.4+/-1.0, year4=24.-+/-0.9, year5=25.2+/-1.0, and year6=29.5+/-1.4mmHg ($p<0.05$). There was a significant diurnal effect between the ages of 2.7-4.8 years with IOPs being highest at 8am ($p<0.001$). Overall average normal IOP was 13.6+/-1.6 mmHg. To date, this is the largest scale description of diurnal IOP in dogs with detailed documentation of gradual IOP increase with age and disease progression in ADAMTS10-OAG dogs, an important large animal model of human OAG.

SPERMATOGENESIS IN MEXICAN WOLF TESTES OF DIFFERING AGES

Bridie McClusky
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 455
Mentor(s): Dalen Agnew (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

Mexican wolves are one of the most endangered subspecies in North America. From 1976 to 1998 the species was considered extinct in the wild until their reintroduction in Arizona and New Mexico. Due to their small population size, inbreeding has become necessary for the species to survive. Past studies have found evidence that the inbreeding in the male Mexican wolf population has reduced sperm quality compared to the generic grey wolf. The purpose of this study is to examine the quality of spermatogenesis in Mexican wolves, allowing population managers to determine the optimum age for breeding success. After puberty, we expect to see a decrease in spermatogenesis as age increases. Differentiation techniques using a digital imaging analysis program (Image Pro®) will be used to establish the ratio of seminiferous tubules to leydig cells. Image Pro® will also be used to measure the surface area of seminiferous tubules, including and excluding the lumen, in microscopic sections. These techniques will provide a morphological proxy for the quality of spermatogenesis in Mexican wolf testes.

A COMPUTATIONAL MOLECULAR EVOLUTIONARY APPROACH TO CHARACTERIZE PROTEINS IN UNDERSTUDIED PATHOGENS

Samuel Chen
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 456
Mentor(s): Janani Ravi (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

The interdisciplinary field of computational biology uses concepts and tools from computer science to drive discovery in biology. In our group, we focus on utilizing molecular evolution and phylogeny to gain key insights into pathogenic proteins. By studying how these proteins evolve across bacterial lineages, we can identify lineage-specific and pathogen-specific signatures and variants in the homologs. The goal of my project is to build a streamlined approach for the molecular evolution and phylogeny of target proteins, widely applicable across protein and pathogen families. As a test case, we examined the phage shock protein (Psp) system and its evolution across all three domains of life (~6500 genomes within bacteria, archaea and eukaryota). Our process currently starts with datasets containing homologs from thousands of species, along with their domain architectures, genomic neighborhoods, and lineages. We wrote custom R scripts to analyze and visualize the conservation of domain architectures and genomic neighborhoods across lineages. To showcase the power of this approach, we built a web-app to allow dynamic analysis and visualization of the Psp data. Our ultimate goal is to build an online platform that enables biologists to run our entire molecular evolution and phylogeny approach on their data by simply uploading a protein sequence file. Additionally, all scripts used for data analysis will be released as an R package that computational biologists can use with their data.

LOCATION OF PRIMORDIAL FOLLICLES IN FIXED HUMAN OVARIAN TISSUE

Anna Coronel

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 457
Mentor(s): Ripla Arora (OBSTETRICS, GYNECOLOGY & REPRODUCTIVE BIOLOGY)

The toxic effects from anti-cancer therapies, such as chemotherapy and radiotherapy, results in premature ovarian failure and damaged ovarian follicles. Different methods are being developed in order to successfully preserve fertility; one available option is ovarian tissue cryopreservation (OTC). Transplantation of a section of the ovary with sufficiently large number of follicles could potentially restore endocrine function and allow multiple cycles to generate oocytes for in vitro fertilization. The cryopreserved ovarian tissue needs to be grafted into the pelvic cavity once oncological treatment is completed and patient is disease free. However, there are challenges associated with the method such as low number of follicles in the graft that may affect the survival of the tissue during ex vivo processing and following transplantation. This project is designed to study the location of the follicles in the ovary and the number of oocytes that survive different cryopreservation protocols. Using whole mount immunofluorescence, fragments of the ovary are stained with markers for oocytes as well as vasculature and visualized using 3D image analysis software. Our goal is to determine the location of hormone-responsive primordial follicles in fixed tissue, followed by identification of physical landmarks (for eg. increased vasculature) in the ovarian cortex. This information will assist clinicians in generating fragments of the ovary with enriched numbers of primordial follicles. The long-term objective of this study is to allow clinicians to graft fragments that have potential for better success post-transplantation to generate viable oocytes in patients who undergo anti-cancer therapies.

DEVELOPMENT OF A MULTIPLEXED STR PANEL FOR GENETIC STUDIES IN ZEBRAFISH

Anthony Nguyen

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 458
Mentor(s): Patrick Venta (MICROBIOLOGY & MOLECULAR GENETICS)

The zebrafish species Danio rerio has become a major model organism for human disease and genetic research. This is in part due to its physical transparency during development and

genetic similarity to humans, which assist greatly in developmental research. However, aspects of the zebrafish model have proved to be lacking; one of these is the ability to identify individual fish and fish lines by DNA fingerprinting. Although many dinucleotide microsatellite genetic markers are available for this and similar purposes, they have certain disadvantages such as an excessive stutter that causes difficulties in cross-laboratory comparisons. To tackle this problem, we present the development of a 13-plex of tetranucleotide and pentanucleotide single tandem repeats (tetraSTRs and pentaSTRs, respectively) that greatly reduce the stutter artifact. The system uses an inexpensive fluorescent universal primer labelling system, which can be modified to use a direct labeling system if deemed necessary. 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. A total of 13 primers were designed and labeled, which all produced excellent amplifications in these multiplexes with good variability among zebrafish strains. This multiplex eventually seeks to standardize and improve the accuracy and reproducibility of studies using the zebrafish model.

ENGINEERING EXTRACELLULAR VESICLES FOR PANCREAS-SPECIFIC DRUG DELIVERY

Shakhlo Aminova

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 459
Mentor(s): Anshu Malik (BIOMEDICAL ENGINEERING), Masako Harada (BIOMEDICAL ENGINEERING)

Cell-derived Extracellular vesicles (EVs) are our body's intercellular communication vehicles that may represent useful drug delivery tools due to their natural capacity as molecular cargo within the body. EVs transport molecules such as proteins, lipids, DNA and RNA between cells or tissues in distant organs. The goal of this project is to develop pancreas-targeting EVs for the selective delivery of molecular drugs to the pancreas. At first, we generated a peptide-EV-display DNA construct using the Seamless Ligation Cloning Extract (SLiCE) method that mediates enzyme-free homologous recombination. DNA fragments encoding a pancreas targeting-peptide and tumor cell-targeting peptide were cloned into EV-display backbone construct harboring the C1C2 domain of the gene lactadherin, which displays peptides on the EV surface. Peptide-display EVs were generated by transfecting these plasmids into a human embryonic kidney cell line (HEK293T) and the EV isolation from the cell-culture media by ultracentrifugation. The expression of the peptide-C1C2 fusion on EVs was verified with western blotting using the antibodies against CD63 (EV marker) and HA-tag (peptide-C1C2 protein). Nanoparticle Tracking Analysis (NTA) confirmed the size distribution and particle number of the engineered EVs. In summary, we have successfully generated EVs decorated with pancreas-targeting peptide and verified the quality and quantity, which will be further used for in vitro and in vivo testing of these pancreas targeting EVs and their selective delivery of therapeutic drugs.

AN IMPROVED SET OF DNA FINGERPRINTING TOOLS FOR THE HONEY BEE

Lindsey Michael

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 639
Mentor(s): Patrick Venta (MICROBIOLOGY & MOLECULAR GENETICS)

Tetranucleotide short tandem repeats (tetraSTRs; also known as microsatellites) have proven useful for DNA fingerprinting in many different species, including humans, but these markers

have not been generated for honeybees (Apis mellifera), despite the importance of bees to agriculture. Effective tetraSTRs could prove useful in further study of these organisms, particularly in population genetics, and the analysis of unique phenomena such as that of colony drifters, which have only been partly addressed in bee studies due to the lower ability of current makers to be accurately genotyped. Markers that have been explored thus far have mostly been dinucleotide short tandem repeats (diSTRs), which can be difficult to analyze due to an artifact called "stutter." TetraSTRs were used instead due to their decreased stutter and increased accuracy for fingerprinting and were identified using the UCSC Genome Browser. One population of bees from Colorado and one from Michigan were used to test 9 tetraSTRs for useful variability in the populations studied, and for their ability to be multiplexed. After performing a multiplex on the sampled bees, they were high-resolution genotyped at the MSU Research Technology Support Facility, and the program Genalex was used to test the hypothesis that these populations would be distinguishable. This analysis demonstrated that these microsatellites were capable of differentiating the two studied populations from one another. Additional markers are being generated to represent each of the bees 16 chromosomes, which then will be used to study the genetics of this important agricultural pollinator.

DOES OXYBENZONE ALTER MAMMARY GLAND IMMUNE CYTOKINE EXPRESSION TO CREATE AN M2 POLARIZING ENVIRONMENT THAT MIGHT PROMOTE MAMMARY TUMORIGENESIS?

Ankit Rattan

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 640
Mentor(s): Anastasia Kariagina (MICROBIOLOGY & MOLECULAR GENETICS), Olena Morozova (MICROBIOLOGY & MOLECULAR GENETICS), Richard Schwartz (NATURAL SCIENCE), Sandra Haslam (PHYSIOLOGY)

Oxybenzone (BP-3) is a major environmental contaminant and a powerful UV blocker found in sunscreen. It is detected in urine of 98% of the United States population. In our preliminary studies on the pubertal mouse mammary gland, BP-3 was observed to enhance estrogen-induced mammary epithelial proliferation in mice fed a high fat diet (HFD). Given the wide exposure to BP-3 and its proliferative effects, we hypothesized that BP-3 might contribute to mammary tumorigenesis. In our earlier work using BALB/c mice that had endogenous mammary epithelium replaced with epithelium from a p53-knockout donor, we found that HFD not only promoted tumorigenesis, but polarized macrophages to a tumor-promoting M2 phenotype. In the current study, we investigated how BP-3 might interact with various high fat dietary regimens to influence macrophage polarization and potentially contribute to mammary tumorigenesis by altering the expression of cytokines IL-4 and interferon gamma (IFNg). IL-4 and IFNg stimulate macrophage polarization towards tumor-promoting M2 and anti-tumor M1 macrophages, respectively. p53-knockout transplant mice yield two types of tumors: epithelial and spindle cell. RNA samples were isolated from both tumor types arising in mice fed three diets ± BP-3: low-fat diet (LFD), LFD switched to HFD (LFD-HFD), and HFD switched to LFD (HFD-LFD), switches occurring at 10 weeks of age, and IL-4 and IFNg were quantitated by RT-PCR. If BP-3 induces an M2 environment, we expect increased expression of IL-4 compared to IFNg. Data will be presented on whether BP-3 alters cytokine expression in a manner that might promote mammary tumorigenesis.

BIOFILM ANALYSIS AND THE ADAPTIVE IMMUNITY OF BIOLUMINESCENT PSEUDOMONAS AERUGINOSA STRAIN XEN5

Lucy Richards

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM

Presentation Number: 641
Mentor(s): Jonathan Hardy (MICROBIOLOGY & MOLECULAR GENETICS)

Pseudomonas aeruginosa is a gram-negative bacterium that is most known being an opportunistic pathogen and for its association with affecting those with Cystic Fibrosis. These infections are difficult to treat due to their strong and viscous biofilms that serve as a natural defense system against antibiotics. In order to find a solution, my research focuses on how to infect and kill P. aeruginosa using the bacteriophage, PAML 31-1 and the subsequent resistance of P. aeruginosa that may follow. Bacteria such as P. aeruginosa can integrate bacteriophage DNA into their CRISPR loci as a form of adaptive immunity, rendering the treatment of the bacteriophage useless. Therefore, the CRISPR loci was located and tested for integration of bacteriophage 31-1 into a spacer. In addition, tests were performed on a bioluminescent strain of P. aeruginosa, Xen 5, along with created resistant strain, Xen5R, to find out more about the biofilm formation that is common of this strain. Tests were conducted to quantify and compare the density of the biofilms, the concentration of bacteria, and necessary media needed for strain Xen5 and Xen5R to grow the most efficiently using IVIS.

EFFECTS OF OXYBENZONE ON MAMMARY GLAND VASCULARIZATION PRIOR TO TUMOR FORMATION IN A P53KO MURINE MODEL

Jake Amcheslavsky
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 642
Mentor(s): Anastasia Kariagina (MICROBIOLOGY & MOLECULAR GENETICS), Olena Morozova (MICROBIOLOGY & MOLECULAR GENETICS), Richard Schwartz (NATURAL SCIENCE), Sandra Haslam (PHYSIOLOGY)

Oxybenzone (benzophenone-3; BP-3), is a major ingredient in sunscreen and many personal care products. BP-3 is a potent endocrine disruptor that is linked to alterations in mammary gland development and may lead to susceptibility to mammary tumorigenesis. We are studying the promotional effects of BP-3 on mammary tumorigenesis in p53ko mice. p53 is a tumor suppressor gene involved in cell cycle regulation. In previous studies, we found that a diet high in saturated animal fat promoted mammary tumorigenesis. Current studies examine how diet might interact with BP-3 in influencing tumorigenesis. Wild type BALB/c mice had the epithelial tissue of their inguinal mammary glands surgically removed and replaced with p53ko mammary tissue. The experimental mice were fed diets with varying levels of saturated animal fat, both with or without BP-3, and mammary tumorigenesis was assessed. We found that BP-3 promoted mammary epithelial tumorigenesis in mice that transitioned from a pubertal low-fat diet (fat = 10% of caloric intake) to an adult high-fat diet (fat = 60% of caloric intake). Compared to tumors arising in other dietary regimens, these tumors showed the most vascularization. This study examines whether enhanced vascularization is apparent in the glands of BP-3 treated 26-week-old mice on a "low-fat to high-fat" diet. 26 weeks of age is prior to the appearance of tumors. Enhanced vascularity at this early stage would suggest a role in tumor promotion. Vascularization was assessed immunohistochemically with CD31 antibodies, which detect endothelial cells that line blood vessels. Data on pre-tumor mammary vascularization are presented.

ALTERED EXPRESSION OF FIBRILLIN 2 (FBN2) IN A DOG MODEL FOR NON-SYNDROMIC CLEFT PALATE

Emma Boismier, Sara Majestic
Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 643

Mentor(s): Brian Schutte (OSTEOPATHIC MEDICINE RESEARCH & ADVANCED STUDY PROGRAMS), John Fyfe (MICROBIOLOGY & MOLECULAR GENETICS)

Cleft palate, a common birth defect, affects 1 in 1,500 births worldwide. It causes feeding difficulties, impaired speech and social developments, and even death. Our goal is to generate a dog model for cleft palate to test new interventions. A dog family in the MSU colony was observed to have a high frequency of non-syndromic cleft palate. Genetic analyses identified three candidate loci, all containing genes that regulate TGFB signaling, a pathway essential for palate development. We hypothesize that expression of the proteins encoded by these genes is altered in fetal pups with cleft palate. We performed immuno-fluorescence with primary antibodies for fibrillin 2 (FBN2), one of the candidate genes, along with FBN1 as a control. We sectioned fetal pup heads with and without cleft palate (N≥3) at 39 days post-conception, the time when the palate shelf fuses in dog development. As expected, we observed no apparent difference in FBN1 expression in cleft versus no cleft fetal pups. However, we observed an increase in FBN2 staining in fetal pups with cleft versus no cleft in sections of the anterior region of the palate. In contrast, we observed a decrease in FBN2 staining in cleft individuals in the posterior region of the palate. This supports the hypothesis that TGFB signaling is altered in the palates of fetal pups with cleft. Specifically, increased FBN2 is expected to sequester more TGFB ligand, decreasing TGFB signaling. This has been shown to decrease cell proliferation and increase cell differentiation, which could explain the cleft phenotype.

THE EFFECT OF CHOLESTEROL CRYSTAL TREATMENT ON BOVINE RETINAL ENDOTHELIAL CELLS IN THE CONTEXT OF DIABETIC RETINOPATHY

Nina Bornemann

Cell Biology, Genetics, and Genomics, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 644
Mentor(s): Julia Busik (PHYSIOLOGY), Sandra Hammer (PHYSIOLOGY)

Diabetic retinopathy (DR) is, especially in the working population, one of the major causes of blindness. This vision threatening disease affects overall healthy retinal function and has a detrimental effect on the vasculature in the early clinical manifestation. In addition to chronic elevated sugar levels, dysregulation of lipid metabolism has been shown to be a pivitol force in disease progression. Previous studies have shown that LXRα signaling, which regulates reverse cholesterol transport is downregulated in the progression of DR causing disruptions in lipid homeostasis and cholesterol accumulation in the retina. This led to the hypothesis that increased levels of retinal cholesterol can cause formation of cholesterol crystals which activate the complement signaling pathway and depict a chronic source of inflammation and cell death. Bovine retinal endothelial cells (BREC) were treated with cholesterol crystals (2mg/ml) to test this hypothesis. Pro-inflammatory genes as well as genes coding for compounds of both the complement pathway and LXR/SIRT1 pathway were examined using real-time quantitative PCR. Treatment with cholesterol crystals for 24hrs resulted in elevated levels of inflammation as measured by IL-1β, IL-6 and IL-8 expression as well as increased complement activation and cell death. However, treatment with alpha cyclodextrin dissolves cholesterol crystal formation and prevents cholesterol crystal induced inflammation. In total, this work demonstrates the detrimental effects dysregulation of LXRα and increased cholesterol accumulation has on normal retinal vascular health.

COULD TASTE RECEPTORS REGULATE GLUCOSE CONSUMPTION IN HUMAN RETINAL MÜLLER CELLS?

Tim Stokes

Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 5, 9:00 AM

Presentation Number: 785
Mentor(s): Susanne Mohr (PHYSIOLOGY)

Diabetic retinopathy (DR) is a major complication of diabetes affecting vision, and to date, it can neither be cured nor reliably treated. Further research is necessary to understand the mechanisms underlying the development and progression of this disease and to develop new and reliable therapies. Clinical studies have shown that elevated blood glucose levels are a major promoter for the development of DR. However, the mechanism by which glucose uptake and consumption is regulated in retinal cells is still poorly understood. Therefore, this study focused on testing the idea that taste receptors might detect excessive glucose while also promoting increased glucose consumption by retinal Müller cells, a cell type that lives primarily from glycolysis and is heavily influenced by elevated glucose levels. Müller cells (MCs) were treated with either normal (5mM) or high glucose (25mM) media for up to 96 hours. Taste receptor expression was then measured via Western Blot analysis. Next, glucose consumption was measured by determining glucose levels before and after high glucose treatment. Müller cell viability was assessed by trypan blue exclusion assays. High glucose-induced cell death in Müller cells (59.413.6) compared to normal (23.815.3) ($p<0.0001$) was recorded. Glucose consumption increased in Müller cells by 2.020.14 fold within 48 hours ($p<0.05$). It was found that taste receptors were expressed on the surface of Müller cells. These data suggest that taste receptors might play an intricate role in facilitating glucose consumption leading to cell death of Müller cells.

UTILIZATION OF PANGENOMES IN COMPARATIVE PATHOGENOMICS

Karn Jongnarangsin
Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 5, 9:15 AM
Presentation Number: 786
Mentor(s): Janani Ravi (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

While Mycobacterium tuberculosis along with other members of the MTB complex, such as M. tuberculosis variant africanum and M. tuberculosis variant bovis, are causative agents of tuberculosis, there also exists non-tuberculous mycobacteria (NTM) which, as the name suggests, do not cause symptoms of tuberculosis. However, several NTM species are animal pathogens and opportunistic human pathogens that cause pulmonary and severe chronic pathologies. Despite shared membership, mycobacterial genomes vary considerably across the MTB complex and NTM, reflected in varied pathologies and diagnostic/treatment plans. Therefore, a systematic genome-wide comparison across mycobacteria (MTB complex and NTM) is warranted in order to determine the sequence features that culminate in the differential pathogenicities and host-specificities. As the genomic comparison is performed over multiple species and strains within groupings, a highly viable method would be to construct pangenomes for each group. Pangenomes allow us to look at identifying characteristics that exist within core or variable/accessory genes. However, the process of constructing a pangenome from a large number of samples involves multiple, computationally intensive, intermediary steps. To address this, our project will focus on creating scripts that will streamline the genome annotation and pangenome construction workflows. The comparative pathogenomics and pangenome workflows developed in this project could be easily repurposed to address several critical pathogenesis-related questions in any bacterial species of interest, for example comparing the S. aureus and MRSA/VRSA drug-resistant strains.

CHRONOPHARMACOLOGY STUDY EXPLORING OXYTOCIN AND MELATONIN RECEPTORS AS POTENTIAL DRUG TARGETS TO HALT PRETERM LABOR

Aneesh Cherukuri
Cell Biology, Genetics, and Genomics, Oral Presentation

Section: 5, 9:30 AM
Presentation Number: 787
Mentor(s): Hanne Hoffmann (ANIMAL SCIENCE)

Nearly one in every ten babies are born prematurely, which amounts to nearly fifteen million babies a year worldwide. Of those fifteen million babies, about one million die before they are able to reach the age of five. Often, these babies will have to deal with a variety of issues which include but are not limited to: cerebral palsy, mental retardation, and other sensory impairments. Sadly, no current treatments efficiently halt preterm labor. Our goal is to identify G-protein coupled receptor (GPCR) signaling complexes which efficiently reduce uterine contractions. Oxytocin activation of its GPCR, OXTR, strongly promotes uterine contractions, and cervical dilation during labor. Although a reduction in oxytocin slows uterine contractions, OXTR antagonists are inefficient in halting premature uterine contractions, and do not prevent preterm labor. On the other hand, uterine contractions are transiently suppressed through light-induced reduction in melatonin. Melatonin is a hormone exclusively released at night, which promotes oxytocin-induced uterine contractions. Melatonin induces uterine contractions through activation of its GPCR, MTR. Using mouse uterine tissue and human derived cell lines from the myometrium and the kidney we asked how MTR and OXTR signaling would be impacted by the time of day, and what signaling cascade the receptors would regulate as a signaling unit. Based on our preliminary data, the MTR-OXTR signaling complex is a novel promising drug target to reduce contractions during preterm labor. Our current work is aimed at further exploring MTR-OXTR interactions and developing an efficient pharmacological approach to silence uterine contractions during preterm labor.

FUNCTIONAL ANALYSIS OF ENDOTHELIN LIGAND GENES IN THE ZEBRAFISH NEURAL CREST CELL POPULATION

Cameron Bennett
Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 5, 9:45 AM
Presentation Number: 788
Mentor(s): Ingo Braasch (INTEGRATIVE BIOLOGY)

Neural crest cells (NCC) are an embryonic cell population unique to vertebrate animals that differentiates into many tissues including heart, pigment cells, peripheral neurons, and craniofacial bone. NCCs form along the developing dorsal neural tube before migrating throughout the embryonic body. The endothelin (Edn) signaling system is a key molecular regulator in cell fate determination, migration, and differentiation into different NCC derivatives. Endothelin ligands and their respective receptors make up the core of the endothelin system. The Edn system emerged at the base of the vertebrate lineage along with the NCC. Subsequent whole-genome duplication events have led to diverse sets of multiple Edn ligand and receptor genes in vertebrate genomes. Our objective is to better understand the function of several Edn ligand genes in the zebrafish Danio rerio. Zebrafish is an established biomedical vertebrate model organism with transparent embryos that are amenable to genome editing and allow visualization of gene expression and function during development. The CRISPR-Cas9 genome editing system was used to first establish an edn3a-/-/edn3b-/-/edn4-/- mutant zebrafish strain. Subsequent knock out
of edn2a and edn2b genes in this line thus created a strain of endothelin ligand quintuple mutants that we are characterizing for neural crest defects. The findings of this study enhance our understanding of the functions of the endothelin system and provide insight into gene function in cases of gene and genome duplication and subsequent evolution in vertebrates.

THE ROLE OF SGLT-2 ON HUMAN MÜLLER CELLS UNDER NORMAL AND HYPERGLYCEMIC CONDITIONS

Alissa Kainrath

Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 5, 10:00 AM
Presentation Number: 789
Mentor(s): Susanne Mohr (PHYSIOLOGY)

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. 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. This study also focused on the effects of human Müller cell treatment with an SGLT-2 inhibitor, Canagliflozin, a promising new therapeutic approach to lower blood glucose levels and control heart disease in Type-2 Diabetic patients. Understanding the role of SGLT-2 and their inhibitors on Müller cells could help to develop new therapies for preventing and treating diabetic retinopathy.

A NEW APPROACH TO PHYLOGENETIC INFERENCE METHODS

Heather Noonan

Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 6, 1:30 PM
Presentation Number: 799
Mentor(s): Kevin Liu (COMPUTER SCIENCE AND ENGINEERING)

In the fields of bioinformatics and computational biology, when trying to construct a phylogenetic tree from a data set, a multiple sequence alignment (MSA) needs to be estimated as a first step. And as is common in research with experimental replication, statistical approaches are used to assess statistical confidence for the result. This estimate is usually calculated through random resampling and re-estimation, where resamples are run through the same MSA algorithm and their results are compared to the original one. Resampled replicates of the same DNA sequences, when passed through the same MSA method, should output the same result (with slight variation), as the underlying evolutionary parameters are equivalent. However, we know with the current MSA methods, this is not the case. The idea behind this study was to utilize the resampling procedure used in confidence estimation to form a more accurate tree. To do this, the SEquential RESampling (SERES) method was used to generate resampled alignments. These alignments, along with the original, were then cross compared, looking for reappearing patterns. Using this knowledge, a newly refined phylogenetic tree was pieced together through human observation. The future goal of this study is to develop new algorithmic techniques to generate a consensus among re-estimations and thereby create a new MSA and phylogenetic inference method.

DETERMINING REPRODUCTIVE AND GENETIC DIFFERENCES OF NEOMYSIS AMERICANA IN RIVER SYSTEMS THAT VARY IN PRODUCTIVITY WITHIN THE CHESAPEAKE BAY

Oliver Autrey

Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 6, 1:45 PM

Presentation Number: 800
Mentor(s): Ryan Woodland (EXTERNAL MENTOR), Louis Plough (EXTERNAL MENTOR)

Pelagic crustaceans such as mysids are a central component of productive food webs in many estuaries and serve as a critical trophic link. Neomysis americana (Smith 1873) is a highly abundant mysid species found in coastal habitats of the western Atlantic; although known to be an important prey item, basic understanding of its distribution, population dynamics, and ecology is lacking. This project investigated spatial patterns in relative abundance of N. americana by examining female fecundity and assessing genetic connectivity of mysids across space and season, focusing on two major tributaries of the Chesapeake Bay, the Choptank and Patuxent Rivers. Tests for length-specific fecundity differences between tributaries indicated the number of eggs per female was higher in the Choptank (ANCOVA, p= 0.002) and spring female fecundity was higher than fall fecundity (ANCOVA, p= 0.02). Preliminary analysis of CO1 haplotype networks using a median joining approach revealed strong regional structure (no sharing of haplotypes between outgroups and CB), AMOVA results confirmed high variation among regions (Phi-St = 0.93). Within Chesapeake Bay, haplotypes were well-mixed and statistical analyses verified no significant spatial (Choptank vs Patuxent) or temporal (June vs. September) differences (AMOVA P >0.5). Given the absence of genetic differences between tributaries based on CO1 data, environmental factors likely play a large role in the fecundity differences observed. Research into the drivers of spatial fecundity differences will help inform development of mysid population models, contribute to our understanding of estuarine food web controls, and better integrate forage into ecosystem-based fisheries management in CB.

OBSERVED SATIATED BEHAVIORS IN FOX SQUIRRELS THAT PARALLEL HUMANS USING E-CIGARETTES CORRELATED TO DRD1 GENE

Jason Jia
Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 6, 2:00 PM
Presentation Number: 801
Mentor(s): Douglas Luckie (LYMAN BRIGGS COLLEGE)

The purpose of this observational study was to explore and compare satiation-response behaviors of humans and fox squirrels and investigate a possible genetic link. Over the course of two months, our team observed squirrels and humans around the campus of Michigan State University and analyzed the satiated behaviors they exhibited. We hypothesized that squirrels and humans both would exhibit satiation responses associated with the release of dopamine for which the DRD1 gene is vital. We predicted that satiated behaviors could be observed in squirrels when they are actively foraging based on Trevor Poole's paper on animal wellbeing. Studies investigating the release of dopamine while smoking led us to predict that satiated behaviors could be observed when humans are actively smoking. In addition to studies of behavior, to pilot an investigation into molecular mechanism, PCR was used to amplify a target sequence of DRD1 from human & squirrel genome extracted from cell samples. We first targeted DRD1 in humans with published primer sequence and probed purified samples from multiple human subjects. The amplified DNA products were analyzed using agarose gel electrophoresis and compared to standard molecular ladders. While a range of previous publications have exemplified cause-effect relationships between the release of dopamine and satiation responses in humans and squirrels, our studies are attempting to contribute a comparison of the responses and seek genetic connections through analysis of the involvement of the DRD1 gene.

THE EFFECT OF ARC6 ON THE INTERACTION BETWEEN ARC3 AND FTSZ DURING CHLOROPLAST DIVISION

Maryam Naeem

Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 6, 2:15 PM
Presentation Number: 802
Mentor(s): Katherine Osteryoung (PLANT BIOLOGY)

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.

QUANTIFICATION OF CRYSTALLINE SILICA PHAGOCYTOSIS IN MAX PLANCK INSTITUTE (MPI) MACROPHAGES TREATED WITH DOCOSAHEXAENOIC ACID (DHA)

Augie Evered
Cell Biology, Genetics, and Genomics, Oral Presentation
Section: 6, 2:30 PM
Presentation Number: 803
Mentor(s): James Pestka (FOOD SCIENCE & HUMAN NUTRITION)

Crystalline Silica exposure has been associated with the development of autoimmune diseases such as lupus. From previous work in a lupus-prone mouse model, our lab has demonstrated the activation of autoimmune responses due to alveolar macrophages phagocytizing silica and protective effects from the omega-3 docosahexaenoic acid reducing inflammatory responses and cell death of macrophages. A crucial issue within this lupus pathway is the deposition and clearance of silica within the lung. Previous methods of quantification of silica have been utilized to address the clearance of silica through various models of translocation. These translocation models were then examined for a direct pathway of clearance, namely by the mucociliary escalator. However, the effects of DHA treatment on this clearance has not yet been examined. Using atomic absorption spectroscopy and infrared spectroscopy, silica can be quantified by molybdenum complexing or adhering to a potassium bromide pellet respectively. From using these methods and adapting protocols from the National Institute of Occupational Safety and Health (NIOSH) Manual of Analytical Methods (NMAM), silica can be isolated by desiccating the lung then ashing in a muffle furnace and resuspending. In this presentation, this method of analysis will be described and applied to MPI macrophages to quantify the phagocytosis rate of silica relative to the initial dose as well as to provide preliminary data to support an animal study to examine 1) the quantities of silica found deposited after dosing intranasally and 2) the potential effect of DHA on the clearance of silica over time in order to clear better understand the mechanism of silica clearance in the body to find new approaches to addressing this exposomal factor in autoimmune disease development.

COMMUNICATION ARTS & SCIENCES

ADHERENCE AND COMPLIANCE IN VOICE THERAPY LITERATURE

Ajay Sreedhar, Andrew Frey, Winnie Kamindo
Communication Arts and Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 195
Mentor(s): Eric Hunter (COMMUNICATION ARTS AND SCIENCES)

Patient compliance refers to the extent to which a patient adheres to a recommended treatment regimen. Compliance is known for its impact on the quality of a patient's therapeutic outcome. The purpose of this study was to review and define the factors affecting patient compliance and adherence to voice therapy. Three reviewers independently searched for articles including the terms adherence, compliance, therapy, and treatments and their synonyms in various combinations of voice and speech therapy. All searches were carried out on the PubMed database and led to initial gathering of 135 articles. After a quick review of duplicates, this number was brought down to 78 and later - after a peer-backed analysis of the article's focus. Initial results indicate that time commitment and travel accommodations are among the leading factors contributing to the detriment of patient compliance to therapy. A better understanding of the factors that impact patient adherence is vital in the creation of treatment regimens and ensuring better therapeutic outcomes.

THEORY OF MIND IN THE HARD OF HEARING POPULATION: EXPANDING ON WHAT WE KNOW FROM THE AUTISM SPECTRUM DISORDER POPULATION

Breana Munroe
Communication Arts and Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 196
Mentor(s): Matthew Phillips (COMMUNICATIVE SCIENCES AND DISORDERS)

This presentation explores the application of Theory of Mind - commonly researched in the children with Autism Spectrum Disorder - to children who are Hard of Hearing. Much has been addressed in regard to the ASD population, and here we are looking to apply what we already know to the Hard of Hearing population. The project begins by describing the interrelationship between Theory of Mind and language development. It then goes on to reflect upon what we already know about Theory of Mind in regard to the Autism Spectrum Disorder population, vis-à-vis research that has been conducted on the topic. Finally it proposes the application of Theory of Mind principles and intervention in the Hard of Hearing population. This presentation ends with a conclusion and discussion regarding next steps for clinical training and research.

EXPERIMENT METHODOLOGIES

Caroline Wright, Grace Daniel, Joao Ardenghyschames
Communication Arts and Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 197
Mentor(s): Anastasia Kononova (ADVERTISING AND PUBLIC RELATIONS), Iago Santos-Muraro (ADVERTISING AND PUBLIC RELATIONS)

Most people intuitively make causal inferences in their daily lives by merely observing the world around them. Scientists, however, are very cautious about establishing causal relationships without controlling for other plausible explanations. Experiments offer a sensible way to study causal relationships to precisely understand causes and effects. Implementing an experiment is not without its challenges. The goals of this project are (1) to discuss the

methodological challenges of implementing a highly controlled laboratory experiment and (2) to establish intercoder reliability for coding textual information. Using data from a mixed factorial experiment design (N = 229) that investigated the effects of media multitasking on the accuracy of answers to online surveys, I aim to present the efforts employed by my rearch team, to control for other plausible competing factors that could interfere with our results. Media multitasking is defined as performing two or more concurrent tasks in which at least one requires media use. Second, I aim to discuss the methodological aspects of coding open-ended survey data. Research assistants were trained to code multiple information from respondents' textual answers to advertising recall questions. When human coding is employed, achieving a high level of intercoder reliability is fundamental to control for coder biases. Results show that intercoder reliability variance is not only a function of coder characteristic (e.g., native language), but is also affected by the nature of the coding variables. For instance, simpler variables (e.g., spontaneous brand name recall) yielded better reliability scores than complex variables (e.g., level of message comprehension).

MEDIA MULTITASKING SITUATIONS, GENERAL MULTITASKING PREFERENCES, AND SELF-BRAND CONNECTIONS AS A PREDICTOR OF TASK ENJOYMENT

Grace Daniel
Communication Arts and Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 198
Mentor(s): Anastasia Kononova (ADVERTISING AND PUBLIC RELATIONS), Iago Santos-Muraro (ADVERTISING AND PUBLIC RELATIONS)

The purpose of the study is to examine to what extent media multitasking situation, multitasking preference in everyday life, and self-brand connection predict task enjoyment. The study was a 2 (media multitasking: two tasks vs. one task) x 3 (ad message repetition: 3 ad videos) between-within subjects experiment. Each participant watched 3 video ads and evaluated them. Participants were split into 2 groups: multitasking (two tasks) or monotasking (one task). In the multitasking condition, participants watched 3 ads and expressed their opinions about them while planning a trip to Brazil. In the monotasking condition, participants only watched the 3 ads without doing additional tasks. Participants reported enjoyment with the study task/s. A series of linear regressions were employed to analyze the data. The results suggest that participants enjoyed the tasks more in the multitasking condition than in the monotasking condition. Also, participants who reported they preferred to do multiple things at once in everyday life (multitasking preference) evaluated task/s as more pleasant than those who do not prefer multitasking. On the other hand, participants who indicated a low preference for everyday multitasking enjoyed the monotasking condition more than the multitasking condition. Lastly, we examined the effect of self-brand connection on reported task enjoyment. Participants who reported high self-brand connection had more positive attitudes toward the task/s. This indicates that watching ads from brands that reflected participants' actual and ideal self-identity exerts a positive influence on task enjoyment.

PRODUCT CHOICE QUALITY AND RELATED OUTCOMES DEPEND ON BRAND FAMILIARITY AND ASSORTMENT SIZE

Joao Ardenghyschames
Communication Arts and Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 199
Mentor(s): Anastasia Kononova (ADVERTISING AND PUBLIC RELATIONS), Aziz Muqaddam (ADVERTISING AND PUBLIC RELATIONS), Patricia Huddleston (ADVERTISING AND PUBLIC RELATIONS)

Many customers who shop online tend to find themselves overwhelmed with the amount of options available in large assortment sizes during their experience. The goal of the study is to explore how brand familiarity and assortment size affect online shopping experiences. Through the simulation of an online shopping setting, the study uses an online experiment method to manipulate brand familiarity and size of assortment to test for the effects of these variables on quality (healthfulness/nutrition value) of choice, satisfaction with choice, experience with shopping task, and task difficulty. The experiment proposes a scenario in which participants need to shop for groceries to cook dinner for a friend. They are instructed to choose the healthiest option because their friend is conscious about health. Participants will see images of familiar (Barilla, Ragu) and unfamiliar (Asta, Tesco) brands of pasta and pasta sauce products. Brand familiarity was pretested. Nutrition labels will be placed under each product's image. Perceived healthfulness/nutrition value of each label was also successfully pretested to check if the best choice can be identified. Two different groups of participants will select products either from the assortment size of 12 options (small assortment) or 24 options (large assortment). The implication of the study is to understand choice criteria that guide participants in online shopping and measure how much each variable affects shopping decisions. The ultimate goal is to use the findings to improve customers' shopping journey and optimize smart decisions.

NEURODIVERSITY AS AN EMERGING SOCIAL CONSTRUCT IN ALLIED HEALTH

Emily Lance, Jenna Fairless, Kayla Baumgartner, Megan Southworth, Sarah Hallowell
Communication Arts and Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 200
Mentor(s): Laura Dilley (COMMUNICATIVE SCIENCES AND DISORDERS)

Neurodiversity refers to the emerging view that neurological conditions like autism are not forms of pathology so much as variant, and often valuable, forms of cognitive difference that require social acceptance and accommodation. Neurodiversity as a scholarly construct can be traced to research in sociology in the late 1990s. From its inception, the term "neurodiversity" acted as a counter to typically stigmatizing labels associated with neurological and psychiatric diagnosesand reframes conditions such as autism, dyslexia, and ADHD as neural differences that have inherent strengths, not just weaknesses. While the term has been most frequently applied to autism within the context of the autism self-advocacy movement, the relatively recent development of the concept and growing usage of the word suggest that its meaning may be in flux. The present study aims to identify how the term "neurodiversity" has been used in the allied health disciplines, and whether this usage has changed over time. A systematic review of research literature in allied health disciplines was conducted using databases that included PubMed, CINAHL, and PSYCInfo. Articles were coded for the diagnostic entities for which the term "neurodiversity" was applied. Preliminary evidence supports the hypothesis that recent research within the allied health disciplines applies neurodiversity to a wider set of neurological conditions and differences than in earlier decades. Implications for efforts toward the de-stigmatization of developmental and applied neurological and other conditions will be discussed.

AN EXPLORATION OF THE PSYCHOLOGICAL SALIENCE AND EMPOWERING QUALITIES OF PERSONAL NARRATIVES

Emily Lance, Jenna Fairless, Kayla Baumgartner, Megan Southworth, Sarah Hallowell
Communication Arts and Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 363
Mentor(s): Laura Dilley (COMMUNICATIVE SCIENCES AND DISORDERS)

Personal narratives about individuals' lives and experiences are often used in journalism, advertising and other forms of written and oral communication due to their attested salience for perceivers. Furthermore, personal narratives have often been identified as having positive, empowering psychological effects in speakers who disclose them, as well as transformative effects on listeners who hear them. Yet historically, personal narratives have been avoided in scientific communications due to perceptions that such narratives are phenomenological, and therefore unreliable and/or invalid in such contexts. The present research re-evaluates the issue of relevance of personal narratives for science communication by means of conducting a systematic review; the primary goal was to identify empirical research and explanatory theoretical frameworks addressing why personal narratives are salient in memory and attention for listeners, as well as empowering for speakers. Results will be considered in light of the potential of personal narratives to enhance communication skills of professionals in research, education, and other disciplines where such narratives are traditionally not employed, as well as the potential applicability to improving science literacy among the general public.

HOW ELECTRONIC TOYS IMPACT THE QUALITY OF PARENT LANGUAGE INPUT PROVIDED TO YOUNG CHILDREN WITH AUTISM

Kaitlin Gaynor, Kaylee Commet, Libby Fernau
Communication Arts and Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 364
Mentor(s): Courtney Venker (COMMUNICATIVE SCIENCES AND DISORDERS), Mackenzie Sturman (COMMUNICATIVE SCIENCES AND DISORDERS)

Electronic toys have become increasingly popular over the past decade, but they may decrease the quality of adult language input provided to young children. This is especially important in the case of children with autism, who often experience language delays. In this study, we asked whether the quality of parent language input to young children with autism differed between electronic and traditional toy play. We hypothesized that lexical diversity (number of different words) and grammatical complexity (words per utterance) would be significantly lower during electronic toy play than traditional toy play. Participants were ten children with autism (2 to 4 years old) and their parents. Parent-child dyads completed two 10-minute play samples. They played with a traditional toy set on one day and an electronic toy set on the other (counterbalanced across participants). Toys sets included a barn with animals, a shape sorter, sensory balls, vehicles, a puzzle, and a toy dog. The electronic toys played music, flashed lights, and made sounds (speech and animal noises). Trained research assistants transcribed the samples. Lexical diversity was significantly lower during traditional toy play than during electronic toy play ($p = .027$), but grammatical complexity did not significantly differ ($p = .700$). An exploratory analysis revealed that electronic toy play produced a higher percentage of parent utterances with overlapping background noise than traditional toy play ($p < .001$). Given the importance of providing high-quality language input to children with autism, the potential impact of electronic toys is an important clinical consideration.

FROM FACEBOOK TO TIKTOK: MOTIVATIONS, USES, AND PRIVACY DETERMINANTS OF SOCIAL MEDIA PLATFORM USE

Anish Nimmagadda, Anvita Suneja
Communication Arts and Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 365
Mentor(s): Saleem Alhabash (ADVERTISING AND PUBLIC RELATIONS)

Despite the fact that social media uses are ubiquitous, emergence of other platforms and their increasing popularity might conjointly shift and modify the ways in which users leverage these systems. From Facebook to Instagram, the world has evolved from status updates and photo albums to followers and photo aesthetics. With the booming popularity of platforms like Facebook, Twitter, Instagram, and Tik Tok, especially among young adults (18-24 years old), the study aims to examine differences in the uses and motivations of these platforms, as well as privacy perceptions. Additionally, the study aims to investigate the ways in which individual difference factors like the "fear of missing out" and self regulation, as well as demographic variables, are associated with different patterns of perceptions about each of the platforms. To do so, we are conducting a cross-sectional survey of students from Michigan State University, where participants report the frequency of using each of the social media platforms and motivations (e.g., information, social interaction, creativity, etc.). These were presented to many 18-24 year olds at Michigan State University in survey format with answer choices ranging from "1" strongly disagree to "7" strongly agree. We hope to see a correlation between the answers to the self-regulation questions and the answers to the rest of the survey to create a conclusion about the motivations of using social media in the 18-24 age group.

FUTURE OF WORK IN FACTORY SETTINGS: EXPLORING ROBOT DESIGN FRAMEWORK AVOIDING HUMAN REPLACEMENT

Shelby Pitts
Communication Arts and Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 366
Mentor(s): Hee Rin Lee (MEDIA AND INFORMATION)

Our team wants to investigate further the factory work environment. We visited a factory that was already using a robot to carry out certain duties as a "water spider." These duties included carrying packages and making sure materials arrived where they needed to be. The issue our team found was the removal of jobs from older workers who previously worked as water spiders to make room for this robotic innovation. We aims to educate workers who know little about the robot and its capabilities, while coming up with a solution to use the robot without interfering with the current factory workflow. We are also interested in creating an educational program that teaches youth about AI, with a focus on what people most want to learn about the advanced technology. A successful program could then lead to the creation of another program involving industry leaders.

THE "BARREN ONE": UNDERSTANDING IN- AND OUT-GROUPING IN ONLINE INFERTILITY FORUMS

Abrielle Mason, Faye Kollig
Communication Arts and Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 367
Mentor(s): Megan Knittel (MEDIA AND INFORMATION), Rick Wash (MEDIA AND INFORMATION)

In online forums like Reddit, conversations and communities are moderated both by formal rules and by the informal policing of frequent commenters. In the r/infertility and r/tryingforababy subreddits, commenters post and interact anonymously, sharing the ups and downs of their lives as they actively try to conceive a child. Our research analyzes the language used by commenters to develop an understanding of the way they talk about infertility technology and the experience of infertility. Through qualitative coding and discussion, we came to understand the patterns of conversation in the subreddit. There is extensive use of in-grouping and out-grouping language, directed within and outside the

subreddit community, towards commenters, friends, families, doctors, and even strangers, which aligns itself with formal reddit rules in interesting ways. This analysis provides examples of how people in communities for medical conditions form and un-form social connections, and provides a window into understanding the importance of language for those with misconstrued or traumatic conditions that may be difficult to talk about elsewhere. This is important and useful to continue to improve our society's understanding and dialogue surrounding infertility and conditions like it to be less exclusionary and more conscientious about how we categorize, behave around, and speak to other individuals.

EVALUATING EDUCATIONAL STEM APPS FOR YOUNG CHILDREN

Sydney Chu
Communication Arts and Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 368
Mentor(s): Fashina Alade (ADVERTISING AND PUBLIC RELATIONS)

Early exposure to STEM-related concepts is critical to later academic achievement. Given the rise of tablet-computer use in early childhood education settings, interactive technology might be one particularly fruitful way of supplementing early STEM education. However, there is still much to learn about how best to support young children's learning from technology. Mobile technology like iPads and tablets are popular devices for young children, and many schools are adopting one-to-one tablet programs for children as young as kindergarten. However, teachers often feel overwhelmed when it comes to choosing which apps to use and understanding which apps are best for different types of learning. This project is part of a larger study that uses a between-subjects experimental design, to determine whether preschoolers could can learn a fundamental STEM concept from educational technology and whether interactivity is a crucial component of learning from that technology. To that end, I will be analyzing several apps that claim to teach children STEM concepts, to understand which apps teach which specific STEM skills, and to highlight the different strategies that apps use to teach these skills to young children.

ETHICALLY FASHIONABLE OR FASHIONABLY ETHICAL: EFFECTS OF APPAREL ETHICAL MANUFACTURING CLAIMS AND PRICE ON ATTITUDES AND PURCHASE INTENTIONS

Alan Smith, Lacie Kunselman
Communication Arts and Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 549
Mentor(s): Saleem Alhabash (ADVERTISING AND PUBLIC RELATIONS)

Fast fashion clothing trends and non-ethical manufacturing contribute to a non-sustainable clothing industry, directly contributing to the polluting of the planet. This study aims to investigate the effects of ethical manufacturing claims and item pricing on consumer attitudes and purchase intentions. The study uses a 2 (ethical manufacturing claim: present vs. absent) x 2 (price: low vs. moderate vs. high) x 2 (message repetition) mixed factorial design, with all factors but message repetition manipulated between-subject. The study's chief objective is to observe if consumer's consider sustainability when purchasing clothing and how much more they are willing to pay for sustainably produced clothes. Participants will be exposed to e-retailer pages featuring a clothing item (e.g., t-shirt, matched to participant's gender) in one the following experimental treatment conditions: (1) product labeled as ethically manufactured with low price, (2) product labeled as ethically manufactured with moderate price, (3) product labeled as ethically manufactured with high price; (4) product not labeled as ethically manufactured with low price, (5) product not labeled as ethically manufactured with moderate price, and (6) product not labeled as ethically manufactured

with high price; where they will, subsequently, evaluate their attitudes toward the product, brand, and purchase intentions. This data can support the clothing/textile industry by providing companies with a pricing model that maximizes the sale of sustainably produced products and therefore decreasing the negative environmental effects of the industry. Data are collected using an online experiment.

HOW CHILDREN WITH TYPICAL DEVELOPMENT PROCESS TELEGRAPHIC VERSUS GRAMMATICAL UTTERANCES: A FEASIBILITY STUDY

Dominik Neumann, Sophia Stevens
Communication Arts and Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 551
Mentor(s): Courtney Venker (COMMUNICATIVE SCIENCES AND DISORDERS)

There is some controversy surrounding whether adults should simplify their utterances telegraphically when working with children with language delays, or use simplified grammatical utterances. Studies from typical development suggest that experimental eye-gaze tasks may be a valuable research tool for investigating this issue, but, to our knowledge, this approach has not been taken with children with language delays. The current study piloted an experimental eye-gaze task to compare the processing of telegraphic and grammatical utterances in children with typical development. Participants were 28 typically developing children from 2 to 5 years of age who took part in a screen-based verb processing task presenting either grammatical (e.g., The doggie is swimming!) or telegraphic speech (e.g., Doggie swimming). Results supported task feasibility. Trained coders determined offline whether the child was looking at the target or distracter image during each time frame. Accuracy was the proportion of looks to target, divided by looks to either image. Our first question looked at the feasibility of using the eye-gaze task to compare telegraphic versus grammatical utterances with typically developing children. Our second question asked whether grammatical and telegraphic utterances were processed differently. A repeated-measures ANOVA revealed no significant differences in the processing of telegraphic versus grammatical speech, though in-depth analyses may reveal subtle differences between utterance types (e.g., a small "head start" in grammatical utterances). Findings pave the way for examining the processing of telegraphic versus grammatical utterances in children with language delays.

THE EFFECTS OF ENGAGEMENT OF ADOLESCENTS' MOTHERS WITH SOCIAL MEDIA ANTI- AND PROVACCINATION CONTENT ON THEIR CHILDREN'S HUMAN PAPILLOMAVIRUS VACCINE UPTAKE WITH VACCINE HESITANCY AS THE MEDIATOR

Rhian Perry
Communication Arts and Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 552
Mentor(s): Kaleigh Wiseley (MEDIA AND INFORMATION), Ruoyu Shen (MEDIA AND INFORMATION), Young Argyris (MEDIA AND INFORMATION)

Objectives: (1) To compare the effects of engagement of adolescents' mothers with anti- and pro-vaccination messages on their children's HPV-vaccination rates, and (2) to identify the role of vaccine hesitancy that mediates such relationships. Methods: In December 2019, we conducted a survey among 426 US mothers of adolescents aged 13 to 18. For data analyses, we employed logistic regression for the HPV-vaccine initiation and completion, and ordinary least squares regression for adhering to the recommended schedule. Results: Mothers' engagement with antivaccination messages is significantly associated with decreases in their children's HPV-vaccination rates, while their engagement with pro-vaccination content is not linked to increases in the rates. Vaccine hesitancy mediates the impact of engagement with

antivaccination content on the rates. Conclusions: Mothers' engagement with antivaccination content increases their vaccine hesitancy, which lowers their children's HPV-vaccination rates. Mothers' engagement with pro-vaccination content does not have any significant effect. Policy Implications: Policy makers should consider suppressing the propagation of antivaccination messages vis social media among mothers, because spreading provaccination messages alone will not be effective and because mothers are the key HPV-vaccination decision-makers.

VR AND NONVERBAL COMMUNICATION RESEARCH

Lucy Wang, Mengxin Tao, Qiqi Wu
Communication Arts and Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 553
Mentor(s): Ralf Schmaelzle (COMMUNICATION)

We expect that VR will be the lead medium of the future and that its application in research will allow for deep insights into the nature of nonverbal communication. In this presentation, we will report on our experiences at the CARISMA lab (Center for Avatar Research and Immersive Social Media Applications). These experiences concern the use of Virtual Reality, motion capture, and character animation technologies in communication research. We will present a study on emotion recognition in VR and introduce the procedures and preliminary results found in our datasets.

DEVELOPMENT OF THE FAMILY MEMBER MARGINALIZATION MEASURE

Emily Lance
Communication Arts and Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 554
Mentor(s): Elizabeth Dorrance Hall (COMMUNICATION)

Family member marginalization is the process of moving to the periphery of one's family. This interpersonal process tends to be involuntary and results from an individual being excluded, different, and/or disapproved of by their family of origin through hurtful communication. The experience of not belonging to a group you are supposed to belong to can be harmful to mental and physical health. Exactly how harmful remains unknown as a scale does not exist to measure family member marginalization. The purpose of this study is to develop a scale that captures the experience of marginalized individuals, people who are sometimes referred to as the "black sheep" of the family. Items from scales of related yet different communicative constructs were considered in the development of this scale. The scale development process and practical implications will be discussed.

RELATIONSHIPS BETWEEN DIFFERENT SOURCES OF NEWS REGARDING THE PRESIDENTIAL ELECTION

Aaron Brookhouse
Communication Arts and Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 555
Mentor(s): Hamid Karimi (COMPUTER SCIENCE AND ENGINEERING), Jiliang Tang (COMPUTER SCIENCE AND ENGINEERING), Tyler Derr (COMPUTER SCIENCE AND ENGINEERING)

With the rise of the internet, people are obtaining their news through a wider variety of ways than used to be possible a mere two decades ago. However, each of these sources do not exist as isolated systems. They influence each other, implying that the impact of a news source is felt beyond just its own readers. Social media, online newspapers, and google

searches have a complicated relationship. In this presentation, we will explore the relationships between the sources seeing which ones most influence the others, and see if the news is an accurate representation of peoples' conversations and interests, or if the news shapes and influences peoples conversations.

THE VOODOO GUY (SHORT FILM)

Jabari Smith
Communication Arts and Sciences, Oral Presentation
Section: 4, 1:30 PM
Presentation Number: 925
Mentor(s): Jabari Smith (LYMAN BRIGGS COLLEGE)

The function of my film will be to provide me with experience in a thorough filmmaking process from script to screen. This process started with me writing a 30-page script about what happens when a woman acquires a functioning Voodoo Doll to exact revenge on her cheating boyfriend. The process then required me reaching out to fellow classmates in the filmmaking field to assist me with production; as well as taking on the role of a director, producer, and lead actor. Upon working with experienced cast and crew members, I recognize that this project will give me the opportunity to specifically learn the technical aspects of producing a film from my counterparts. The knowledge that I gain from this experience will be imperative to my pursuit of a professional career in the film industry, my ability to network with others in that industry, and consistently add quality content to my portfolio in the future. I also will generously pass on the knowledge and stories from this experience to others who engage in similar projects in the way that my mentor has done so to me. The success of this project is based on the uniqueness and transparency of the messages of the story as well as the technical quality of the project.

BECOMING MR. TAYLOR

Ruth Blohm
Communication Arts and Sciences, Oral Presentation
Section: 4, 1:45 PM
Presentation Number: 926
Mentor(s): Amol Pavangadkar (MEDIA AND INFORMATION)

In 1997, a very special teacher set 8-year-old Danny Taylor on the path to becoming an educator. Through his own perseverance and the influence of supportive teachers, Danny achieved his dream. He now carries on the tradition of positively influencing students in his own classroom and community. This short documentary tells Danny's story in his words and the words of those who were integral to his success while exploring the positive influence that educators have on their students. Producing this short film has been an overwhelmingly positive experience for me. Not only did this project allow me to sharpen my skills as a filmmaker, but it also allowed me to tell a story that I feel is especially important. As a parent, I have seen the effects that caring, dedicated teachers have on their students. Producing this film has given me the opportunity to bring attention to educators who put their students first and who work hard to make a positive impact in their classrooms. As a part of this project, I had the privilege of speaking with both teachers and students. Through those interactions, I learned a great deal about how much educators truly care about the well-being of their students. In the future, I would like to be able to shine a light on more teachers who have had lasting positive effects on their students' lives.

QUALITATIVE AND QUANTITATIVE METHODS IN RESEARCHING CRISIS COMMUNICATION

Chloe Peter
Communication Arts and Sciences, Oral Presentation

Section: 4, 2:00 PM
Presentation Number: 927
Mentor(s): Manuel Chavez (JOURNALISM)

Climate Change. The novel coronavirus epidemic. Mexico's War on Drugs. Violence against journalists. Foreign interference in the 2016 presidential election. Families being separated on the United States' southern border. These are just a few types of crisis the United States and the World have faced in the past few years. Unfortunately, crises will likely continue to arrive in years to come. In today's 24-hour news cycle, there is no shortage of reporting about these crises. But how can the news media frame these events in a way that most effectively communicates to the public? Accurate framing of crises is further complicated by the rise of social media, particularly Twitter, which allows newsmakers to communicate with media consumers constantly and directly. In addition, anybody would be able to post inaccurate, misleading or fake news and information. The crises that arise worldwide are diverse and challenging, as are the mediums used to report on them. But by using qualitative and quantitative research, sources including tweets, news headlines, and scholarly articles can be used to determine and analyze frames used in communicating crisis to the public, yielding accurate and ethical communication.

UNDERSTANDING HARD RISKS AND CRISIS IN THEORIES AND METHODS

Hannah Brock
Communication Arts and Sciences, Oral Presentation
Section: 4, 2:15 PM
Presentation Number: 928
Mentor(s): Manuel Chavez (JOURNALISM)

In order to understand international crisis through a media lense, I completed comprehensive academic research on the definition, methods, and theories regarding international crisis. These concepts are then applied to international crises such as pandemic, drug related violence, migration and natural disasters in order to understand how media interacts with and reports on them, and how this affects governments and social institutions.

ANIMALS IN SPACE: THE VISUAL PORTRAYAL OF THE FIRST TRUE EXPLORERS

Rachel Hitchcock
Communication Arts and Sciences, Oral Presentation
Section: 4, 2:30 PM
Presentation Number: 929
Mentor(s): Howard Bossen (JOURNALISM)

Man would have never walked on the moon if it was not for the fruit flies, dogs and monkeys that went before. Animals were integral to the success of the space program, providing valuable information to scientists which would keep humans safe as they embarked on the unknown. I trace the progression of animals used and the variance amongst animals chosen through photographs, information graphics and illustrations from the press and the National Aeronautics and Space Administration (NASA) that are part of an extensive image collection, accumulated in a database. With images, books and research reports from NASA and the Chief Veterinary Officer, the wellbeing of animals partaking in such studies is examined on both the United States and Soviet Union's sides showcasing a difference in methodologies. Photographs of Soviet stray dogs turned cosmonauts contrast with the United States' monkey astronauts. The political motives of the two countries and advancing technologies that made television a reality contributed to the sense of urgency in space exploration, resulting in a variance of practices used in an attempt to win the race. News media documented the work of these animals, garnering public support for space missions and increasing national pride. Technological advancements in science and communication and rising Cold War tensions contributed to the enhancement and importance of animals in the

space program and their integral role in putting a man on the moon. Animals will never know the impact they had on the space program, but their legacy will live on.

DIGITAL HUMANITIES

NARRATIVE CONVERGENCE WITHIN DEMOGRAPHICS

Natasha Desouza
Digital Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 575
Mentor(s): Natalie Phillips (ENGLISH)

The Music and Narrative study is conducted by the Digital Humanities and Literary Cognition (DHLC) and Timing, Attention, and Perception (TAP) labs at Michigan State University (MSU), in conjunction with the University of Arkansas. 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 what, if any, stories or elements of a story they heard while listening. Prior to listening to these excerpts, the participants were asked to complete comprehensive surveys which collected demographic information regarding factors such as age, handedness, hearing capabilities, and musical familiarity. This study aims to reveal correlations between certain demographic factors and elements of narratives which were produced. Within the narratives, without consideration or awareness of any of these factors, a group of researchers subjectively rated quantitative levels of elements such as narrative richness, detail of events, characters, and setting, and mentions of popular culture. We then used digital humanities tools in order to ascertain potentially significant correlations between survey responses from participants and the narratives which they subsequently produced. Such correlations may bear pertinent implications in terms of how certain factors influence the way in which people psychologically process musical stimuli.

IMPROVING ACCESSIBILITY AND ACKNOWLEDGING CONTINUED RELEVANCE AND HISTORY THROUGH RED CEDAR REVIEW ARCHIVES

Claire Walsh, Emma Langschied, Jarett Greenstein
Digital Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 576
Mentor(s): Robin Silbergleid (ENGLISH)

Red Cedar Review, the undergraduate-managed publication based in the Department of English since 1963, provides a fruitful research site for the examination of the history of undergraduate literary magazines, including the shift from print to digital publication. Over the course of the journal's history, it has undergone substantial changes, including (1) foregrounding its commitment to undergraduate students by publishing only writing and art from students across the United States and (2) shifting from a print magazine to open-access digital publication. As a way to preserve a clear history of the journal as well as explore the pedagogical, intellectual, artistic, and economic issues at work in these shifts, student researchers have been working to (1) create a complete archive of the journal's history, (2) develop metadata to make the archive more easily searchable and, (3) select pieces from the archive to highlight on its webpage in the library Digital Repository, and in the Short Edition publication kiosks available on campus and in East Lansing. Through this process we have learned to improve accessibility in the Red Cedar Review archives by reading pieces from past issues which resonate with readers today and showcase the journal's past and continued relevance.

THE ARCHIVE OF MALIAN PHOTOGRAPHY

Aria Frawley

Digital Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 577
Mentor(s): Candace Keller (ART, ART HISTORY, AND DESIGN)

I am operating as a student representative from the Archive of Malian Photography. Our teams in Bamako, Mali and East Lansing, Michigan clean and digitize hundreds of thousands of photographs from five important photographic archives. MATRIX, Michigan State University's center for digital humanities and social sciences, has helped to archive and share around 100,000 of these negatives and original prints dating from the 1940s-90s. This work is incredibly important as the archives are/were at risk of physical deterioration as well as market exploitation. The project ensures that archival collections remain in Mali, the negatives are better preserved, low-resolution copies are freely accessible, high-resolution copies are conserved, a digital repository (in French and English) is managed by Matrix at MSU, and access to it in Mali is provided by the Maison Africaine de la Photographie. The international recognition of these artists is due, in part, to the unique techniques and aesthetics that each photographer works to achieve in their individual bodies of work. It is also due to the fact that each archive functions as a vital part of Malian culture and history as well as a significant lens into urban life in Mali (and by extension, West Africa) for the rest of the world. Currently, I am working to edit and improve the metadata in the database. I am also aiming to expand AMP's social media accounts to increase exposure to these photographers. These accounts aim to serve all of our audiences and to keep Malian culture relevant internationally.

REFLECTIONS OF FEMINISM:DEPICTIONS OF FEMALE EMPOWERMENT IN FILM

Zoe Kernohan

Digital Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 578
Mentor(s): Joy Coates (AFRICAN AMERICAN & AFRICAN STUDIES)

Through an in-depth analysis of film for three decades, this study examines women in film and explores these depictions in relation to the waves of feminism. Thus, the goal of this project is to evaluate the depictions of feminism in film. The purpose of this study is to demonstrate the influence of media in the 80s, 90s and 2000s. Do these films offer an alternative method of learning about feminism? Each film to be examined was made during crucial times of the feminist movement, and this study seeks to explore the links between these films and feminism. How have the depictions of women in films changed over time, and have they adapted to the different goals of feminism? How have women in film influenced real-life women, and what can anyone learn about feminism through movies with strong female characters? It is important to keep an open mind about feminism since it is always progressing. But, how is this progress depicted in the movies? This research project will examine 9 to 5, Thelma and Louise and Erin Brockovich to find out.

STRATEGIES AND DIGITAL TECHNOLOGIES FOR ORGANIZING EDITORIAL TEAMS THAT WORK REMOTELY

Megan Elias, Sophie Schmidt

Digital Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 579
Mentor(s): Alexandra Hidalgo (WRITING, RHETORIC, AND AMERICAN CULTURE)

Our group—consisting of two undergraduates and one faculty member—is a collaborative editing team that works on the online publication agnes films. For this poster presentation,

we will feature strategies to run a publication whose members work remotely. We will go in-depth on the ways we train, communicate, and manage content. Students on the team range in experience from a few months to over a year, which provides multiple points of view to the insight we can provide on the publication process. Our Assistant Editor addresses how the onboarding process is made easy by the use of documents that act as a reference for how our publishing process works and what each person's responsibilities are. Our poster provides visual representations of the technologies we use. We show how Google docs is an efficient technology to organize and edit writing, how using Facebook Messenger creates a tight-knit community within the team, and the benefits that our newest tool, Trello, has brought to our processes. We recently switched from using Google Sheets to Trello to keep our 40+ works in progress documented, so our poster includes a comparison of the two and how the transition has made our meetings more organized and led to a significant decrease in downtime required to manage the system. Our Managing Editor discusses other changes we've made to increase productivity and ideas to continue doing so in the future. We argue that our methods can be used by other publications to streamline their own publication processes.

PAVING OUR MICHIGAN AVENUE: INSPIRING COMMUNITY DELIBERATION

Louai Massri, Max Moses
Digital Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 580
Mentor(s): John Monberg (WRITING, RHETORIC, AND AMERICAN CULTURE)

This study aims to invent a tool that will improve community deliberation in East Lansing and the Greater Lansing Area. It is intended to deliver a sense of belonging to all residents through informing, inquiring, and interacting with all other community members. Through this research, it was noticed that there was a lack of representation from the very citizens that are being affected by further city development and major financial decisions. It felt as though the community was disconnected from nearly all municipal relationships. The initial steps taken to solve this problem refer to the research conducted in Dr. John Monberg's courses at Michigan State University. This allowed for the analysis of data as well as opening opportunities to conduct interviews, case studies, prototyping, and design critique. While conducting this research, there was a focus on the process of design thinking strategies. From the extensive research and development done for this project, the outcome can be seen at www.ourmichiganave.org. The website provided serves the people of the community in order to give everyone the opportunity to inform themselves or to make their opinions heard in a city-wide setting. After gaining feedback, it was noted that this website is highly successful by providing such an impactful tool while also meeting design standards and giving users an aesthetically pleasing experience. From this study, students and faculty of MSU were able to locate a prominent issue within the community and furthermore united ideas, resulting in an improved experience for all.

IMPLEMENTING FEMINIST COLLABORATION IN DIGITAL SPACES

Kara Headley, Tiffany McIntyre
Digital Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 581
Mentor(s): Alexandra Hidalgo (WRITING, RHETORIC, AND AMERICAN CULTURE)

Our social media team of two undergraduates collaborate with each other and with a faculty member on a foundation of feminist social media techniques to run five social media accounts. For this presentation, we will be focusing on collaborative social media between the publication agnés films and the film production company Sabana Grande Productions. We will be looking at how we support each other professionally in both digital and tangible spaces by

drawing from shared articles, popular posts, tagging and commenting techniques, and reciprocity between our two main accounts with each other and other members of our online community. We work to follow six principles of feminist social media developed by Alexandra Hidalgo and Katie Grimes in their 2017 video essay "A Feminist Approach to Social Media" published in Kairos: A Journal of Rhetoric, Technology, and Pedagogy. Those principles are collaboration, reciprocity, non-competitiveness, respect, community-building, and patience. Because we work together to adhere to these ideals we have seen a growth in our audiences. agnés films has increased its Twitter following from 2,328 followers in May to 2,659 followers in February (a 14.2% increase in 9 months), and Sabana Grande has grown from 771 in May to 878 in February (an 8.7% increase). Using these techniques and more, the social media accounts of agnés films and Sabana Grande Productions Productions work together tirelessly to create a feminist social media experience.

STORYTIME
Krubel Habteyes
Digital Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 582
Mentor(s): Philip Gardner (CAREER SERVICES & PLACEMENT)

StoryTime is a platform that I have built and it aims to help individuals and businesses tell compelling stories about the problems they solve and what skills they used to solve that problem. Individuals using this platform will be able to connect with mentors to help them refine their stories so that it becomes more persuasive. We all have experiences in life, but we don't always understand the full scope of those experiences. By allowing users to have structured conversations with mentors we help them find the true meaning of that experience and also tell a story about it.

DIGITAL MEDIA

FILMETRY PIECE
Isaiah Johns, Jabari Smith
Digital Media, Oral Presentation
Section: 1, 9:00 AM
Presentation Number: 911
Mentor(s): Brian Gilmore (COLLEGE OF LAW), Peter Johnston (ENGLISH)

This short film is a piece that will be included in this year's Filmetry Festival, a festival where filmmakers take poems and turn them into short films. This film is an adaptation of the poem "living for the city" written by MSU faculty member Brian Gilmore.

CREATIVE MEDIA IN THE REAL WORLD
Dylan Kissel
Digital Media, Oral Presentation
Section: 1, 9:15 AM
Presentation Number: 912
Mentor(s): Amol Pavangadkar (MEDIA AND INFORMATION)

For the past year and a half I have been working with the Michigan Department of Health and Human Services in conjunction with Michigan State University. This project's goal is to film promotional videos for the Parent Management Training program (PMTO). While working with my mentor, Professor Amol Pavangadkar, I have produced seventeen videos based around six different families and the effects this program has had on their lives. Throughout

the process I have had the chance to work with and study dynamic family situations while interviewing them about their experiences with the program. The project has been in the editing phase since September of 2019. Throughout the editing process there has been constant communication between me and external sources such as my partners, the state government, and the University giving me the chance to work in a real world editing environment that involves constant changes and deadlines.

SMALL TOWN SPARK
Avery Tingley
Digital Media, Oral Presentation
Section: 1, 9:30 AM
Presentation Number: 913
Mentor(s): Amol Pavangadkar (MEDIA AND INFORMATION)

Small Town Spark is a documentary about a group of families from Milford, MI trying to get a skate park built in town. The group, called Project S-park, has faced a lot of turmoil since deciding to take on the project. Since a different group of people over 10 years ago tried to build a skatepark in town and failed, Project S-park has taken over and has had success despite all of the issues they have faced. In this film, we will take a look at all of the success and struggles that Project S-park has overcome, along with what the project means for the community.

ISOLATION
Erik Kadar, Rachid Chatti
Digital Media, Oral Presentation
Section: 1, 9:45 AM
Presentation Number: 914
Mentor(s): Amol Pavangadkar (MEDIA AND INFORMATION)

After his Schizophrenic brother in law goes off the grid to live in the woods, a man enlists the help of three friends to bring him back, not realizing that he may not be so willing to return to society. My learning goals for this project were to experience all of the stages of producing a short film from the conceptualization and pre-production process all the way through the production and post-production processes. I learned about almost every aspect of filmmaking from writing, to location scouting, to acting, to directing, all the way to editing and coloring. This topic is relevant to today's society as it explores not only mental illness but how other people treat or deal with those who struggle with mental illness.

WE ARE FLINT
Sophie Fabyan
Digital Media, Oral Presentation
Section: 1, 10:00 AM
Presentation Number: 915
Mentor(s): Judith Walgren (JOURNALISM)

Latashia Perry is a lifelong resident of Flint, a successful business owner, a wife, and a mother of five. Through filming an interview and filming daily life, we learned about Latashia Perry's thoughts about Flint, the environment she lives in and she and her families' life there. We explored her ideas around what the future holds for Flint and what she hopes to see Flint evolve into. We worked one on one with Latashia to tell her story and express her thoughts about what it means to be a person from Flint. The ultimate goal of this mini-documentary was to support people living in Flint to create their own narratives around the city and to shine a more positive light on Flint and its residents who positively contribute to their community.

THE DOCUMENTED
Ben Goldman
Digital Media, Oral Presentation
Section: 1, 10:15 AM
Presentation Number: 916
Mentor(s): Geraldine Zeldes (JOURNALISM)

"The Documented" is a series of in-depth interviews with Michigan State University students impacted in the last couple years by immigration policies.

EDUCATION

INTERSECTION OF CONFIDENCE, CORRECTNESS, AND GROUP DYNAMICS ON FORMATIVE ASSESSMENT
Shanna Hilborn
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 9
Mentor(s): Ryan Sweeder (LYMAN BRIGGS COLLEGE)

Formative assessment is critical for helping students develop and self-assess their understanding of core chemistry concepts. Using a texting system, we engaged students with regular out-of-class formative assessment questions that challenge students to create scientific explanations to phenomena. By asking students to evaluate their confidence level after each assessment, we can determine whether student confidence was influenced by individual student characteristics, such as gender or prior level of success in the class, and then if confidence was a predictor of correctness in their answers. After creating individual submissions, students work in groups to develop a consensus answer that would be expected to build on the strengths of the individuals' answers. However, some students will contribute more or less than others while creating a group answer. This inequality is driven by varying individual student confidence and other factors such as social gender norms, stereotypes, and past success. By measuring individual self-reported confidence levels and comparing individual student answers to the respective group answer, we were able to identify the factors that predicted whether or not a student's individual answer was likely to be incorporated into their final group answer. Understanding both how accurately students gauge their own confidence and how this translates to their willingness to advocate for their own answers in a group setting helps to influence how we can most successfully structure group formative assessment activities to be beneficial for all students involved.

EXPLORING SOCIAL INTERACTIONS IN A TRADITIONAL LABORATORY: A THEMATIC APPROACH OF STUDENTS EXPERIENCES IN NON-MAJOR ORGANIC LABORATORY
Zoe Buszka
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 10
Mentor(s): Elizabeth Day (CHEMISTRY), Melanie Cooper (CHEMISTRY)

Despite the historical and cultural importance of laboratory coursework, there has been few studies ascertaining the effectiveness of the laboratory curriculum. In our previous work, the cooperative, project-based laboratory learning approach has improved several student outcomes as compared to a traditional, verification-style laboratory curriculum. Currently, at Michigan State, we are transforming our non-majors organic laboratory course to this project-based collaborative style. It is our goal to probe the experiences of students in this course

context before and after the transformation. Using semi-structured interviews and a phenomenographic approach, we investigated students' experiences in a non-majors organic laboratory course at Michigan State University. There were twenty four participants who shared their experiences about learning in both the traditional, cookbook laboratory setting as well as previous experiences in a cooperative, project-based laboratory setting. A team of coders engaged in thematic analysis to generate initial codes which were consolidated into themes of group idealism, connections to coursework and teaching-assistant (TA) interactions. As a result we analyzed pilot interviews to modify this interview protocol for future data collection before and after the laboratory course curriculum transformation to a project-based, cooperative style.

REVENUE SOURCES AND DISTRICT SCHOOL CHOICE PARTICIPATION IN MICHIGAN

Tanner Thering

Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 11
Mentor(s): Corwin Smidt (POLITICAL SCIENCE)

With the 1996 implementation of Sections 105 and 105c of the State School Aid Act, traditional public school districts in Michigan were allowed to receive state funds for enrolling pupils who did not reside within the enrolling districts' geographic boundaries. This marked a critical point in the implementation of open enrollment, interdistrict school policies in Michigan, and gave financial incentive for districts to attract outside students, and their associated state funds. Local funding via property taxation, however, still plays a major role in the overall school funding picture, with local sources providing 28.8% of money to school districts in the 2018-19 school year, according to data from the Michigan Department of Education. Because local funding levels are determined by geography of taxable land, and not enrollment levels, local funds, unlike state funds, cannot follow a student from district to district. This lack of transferability of local funds lowers the average per pupil funding for a district that enrolls a non-resident student. Using 2017 student count and financial data from the Michigan Department of Education, we analyze the relationship between non-resident student enrollment and composition of total district revenue, by revenue source. We hypothesize that districts with lower levels of local funding are more likely to attempt to attract non-resident students and their associated state funds.

AN EVALUATION OF CONCRETE AND VIRTUAL ALGEBRA TILES FOR STUDENTS WITH MILD INTELLECTUAL DISABILITY

Anna Domka

Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 12
Mentor(s): Emily Bouck (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

There are many ways to support students with disabilities in learning mathematics, one of which is with the use of manipulatives. Concrete manipulatives are objects that students can physically manipulate to form representations of mathematical concepts whereas virtual manipulatives are usually based on concrete manipulatives and are available in apps or computer programs. This study explored the extent to which students learn to solve algebraic equations when given virtual, app-based manipulatives or concrete manipulatives with added scaffolds as well as the extent to which students are independent in using the manipulatives. Three middle school students with intellectual disabilities participated in training, baseline probes, an intervention phase, and a best treatment phase which were all evaluated based on accuracy and independence in order to carry out this study. The study found that overall the

participants preferred to use the concrete manipulatives as opposed to the virtual manipulatives.

AIN'T I A GIRL WHO DESERVES REPRODUCTIVE RIGHTS?

China Gross
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 13
Mentor(s): Rashida Harrison (JAMES MADISON COLLEGE), Tamara Butler (ENGLISH)

Discussions of Reproductive Rights have returned to the national political platform under the Presidency of Donald Trump; Displayed through the essence of the women's march. The reinvigorated movement is rightly responding to the constant economic and policy changes that put women's reproductive power at risk. In 1977, the Combahee River Collective noted that their members had been deeply committed to projects rooted in "sterilization abuse, abortion rights, battered women, rape and health care." They emphasize that Reproductive Rights is part of the Black Feminist agenda, one that promotes "a collective process and a nonhierarchical distribution of power within our own group and in our vision of a revolutionary society." Therefore, this project works at the intersections of race, gender, and age to address the following questions: How might we develop Black feminist-informed social movements that include and center Black girls? What does more culturally-responsible sex education and reproductive rights advocacy look like? How does a Black girls' centered sex education inform "our vision of a revolutionary society"?

EXPLORATION OF ORGANIC CHEMISTRY STUDENTS' DRAWINGS AND EXPLANATIONS ABOUT ELECTROSTATIC FORCES

Savannah Finley
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 15
Mentor(s): Samantha Houchlei (CHEMISTRY)

Electrostatic forces are an important concept that students will use throughout organic chemistry. The focus of this research is to develop an assessment to quantify student drawings and explanations of the electrostatic forces involved in an organic chemistry reaction. More specifically, this study investigated students' depiction of the curved arrow notation for the flow of electrons between molecules and their understanding of the electrostatic interactions between the molecules. Drawings and explanations were compared for students in both a traditional lecture-style and a transformed organic chemistry course, Organic Chemistry, Life, the Universe, and Everything (OCLUE). Preliminary result show that students who are in OCLUE leverage electrostatics in their responses more often than students in a traditional curriculum. The future direction of this work is to determine if Automated Analysis of Constructed Responses (AACR) can be used to predict the ratings of student responses with accuracy similar to that of a human coder.

CAN ORGANISMAL CONTEXT INFLUENCE STUDENTS' EXPLANATIONS OF NATURAL SELECTION?

Devin Babi
Education, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 16
Mentor(s): Tammy Long (PLANT BIOLOGY)

Evolution is a complex topic that is challenging for both teachers and learners. Despite direct instruction, students demonstrate a limited understanding of key evolutionary concepts and

struggle to transfer their ideas across contexts. For example, minor features of question prompts (e.g., taxa, trait type, scale) have been shown to influence students' reasoning. My research seeks to answer the following: Is student understanding of the components of natural selection, a mechanism of evolution, consistent across different organismal contexts? Student responses will be analyzed from three introductory biology assessments given during different semesters. Student performance will be coded using a research-validated rubric that assesses five key concepts of natural selection: variation, heritability, competition, limited resources, and fitness. My analyses will explore whether students apply consistent reasoning when explaining natural selection across different organismal contexts. Results may have implications for how instructors use contexts, such as different organisms, as an explicit part of their instruction.

ANALYZING CONNECTIONS BETWEEN ENERGY AND INTERACTIONS IN STUDENT RESPONSES TO ASSESSMENT PROMPTS

Robby McKay
Education, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 14
Mentor(s): Melanie Cooper (CHEMISTRY)

Through a knowledge-in-pieces lens, we can think of student knowledge as being both the ideas students have and how they connect those ideas. Two ideas that should be closely connected in chemistry are energy and interactions. This study explores undergraduate students' utilization of causal mechanistic reasoning, a useful form of scientific reasoning which addresses how and why a phenomenon occurs, when responding to two summative assessment prompts. One prompt addresses the electrostatics involved in the formation of London Dispersion forces between two neutral atoms and the other prompt addresses the changes in potential energy as two atoms approach each other. By examining student reasoning across content areas, we can determine where students are and are not making connections between these foundational concepts in chemistry. Understanding student reasoning is imperative to informing current and future teaching as well as for refining learning experiences for students in the classroom.

PEACOCKS AND SPARROWS: THE IMPACT OF APPLIED EXPERIENTIAL FEMINISM IN EXPERIENTIAL EDUCATION COURSES.

Aalayna Green
Education, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 371
Mentor(s): Eleanor Louson (HUB FOR INNOVATION IN LEARNING & TECHNOLOGY), William Heinrich (HUB FOR INNOVATION IN LEARNING & TECHNOLOGY)

xperiential education programs expand on the dominatrix relationships between the professor and students within traditional undergraduate classrooms. Traditional undergraduate classrooms follow a patriarchal structure: classrooms position professors into an imobile authoritative position, both physically and emotionally. This blatant portrayal of power puts students in a position where their voices are not respected nor acknowledged . Contrastingly, experiental learning courses build upon a framework found in feminist education literature. Applied experiential feminism utilizes a foundation of policy and advocacy that potentially exists within classrooms, and positions that so student's are able to develop ownership on their own accord within the course. This study sought to answer the question: In what ways is the success of an experiential education course more dependent on the feminist applications of the instructors, the feminist makeup of the students within the course, or the feminist characterization of the course itself? How is the application of feminist

practices in experiential education different than those found in traditional courses? After analyses through the lens of feminist education student's reported experiences in three undergraduate experiential learning courses at Michigan State University, we found that (1) the structure of the student-professor relationship more closely emulated that seen between professional colleagues, a result of the class space and the students' ownership of the projects and (2) gender representation and success were apparent in the educational and professional outcomes of undergraduate students. The reorganizing of the traditional, dominating patriarchy that exists within undergraduate classrooms to one which exudes an interdisciplinary and progressive foundation is essential for student educational, professional and emotional development. In this sense, Applied experiential feminism contributes to student social development by encouraging leadership and more equitable representation within the classroom.

SUPPORTING STUDENT COMPETENCY BELIEFS IN MIDDLE SCHOOL SCIENCE CLASSROOMS

Marvella Gutierrez, Mary Kott
Education, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 372
Mentor(s): Brooke Thomas (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Harmony Murray (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Jennifer Schmidt (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Lisa Linnenbrink-Garcia (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Pei Pei Liu (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Stacy Priniski (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

Competency beliefs refer to a students' confidence in their ability to do well, and research has shown these beliefs to have a powerful impact on student academic performance. Educators can influence students' competency beliefs through instructional design, meaningful feedback, and challenging work. These positive, competency-building actions within a classroom are beneficial to student academic achievement, but more research is needed to understand how teachers support competency beliefs in the classroom. To further explore how teacher actions support student competency beliefs, we conducted a qualitative observational study examining the actions taken by a middle school science teacher. We analyzed videos from the same teacher/classroom. These videos had been previously coded by researchers for teacher actions that were supportive of student competency beliefs in the classroom, allowing us to examine teacher behavior in greater detail. Our iterative coding process was guided by the following questions: How do teachers support competency beliefs in their students in middle school science classrooms? Does teacher support of student competency beliefs occur more in whole group or individual interactions? The results from our study can help us to better understand how teachers' actions impact students' competency beliefs, as well as help educators in the field broaden their own understanding of how to support student competency beliefs in the classroom.

THE RELATIONSHIP BETWEEN EXPERIMENTATION WITH AVIDA-ED AND UNDERGRADUATE STUDENT LEARNING OF KEY EVOLUTIONARY CONCEPTS

Anna Bowling
Education, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 373
Mentor(s): Tatnall Pennock (LYMAN BRIGGS COLLEGE), Diane Blackwood (LYMAN BRIGGS COLLEGE), James Smith (LYMAN BRIGGS COLLEGE), Louise Mead (BIO/COMPUTATIONAL EVOLUTION IN ACTION), Michael Wiser (BIOLOGICAL SCIENCE PROGRAM)

Evolution and natural selection have long been some of the most difficult topics to teach students. These challenges mostly stem from the fact that evolution itself is very hard to observe, especially in a classroom setting. Over the past decade, the interactive software, Avida-ED, has been used as a tool to simulate evolution digitally and provide students with an opportunity to engage with Darwin's theories in an experimental way. Within the application, students have the ability to manipulate the virtual petri dish environment and the genomes of the organisms that reside there. They then can watch the trends of the population change in real time, making it unique from other digital evolution simulators. To test the efficacy of Avida-ED, six different sections of an introductory biology course were given the Conceptual Inventory of Natural Selection (CINS) examination in a pre-/post-test design (n=525 students total). Two instructors each taught two of these sections individually, one with Avida-ED and the other without; they taught the other two sections together, again only one with Avida-ED as a part of the curriculum. Using a paired t-test, we then compared the mean change in test score for 6 key concept questions on the CINs exam between the sections that used Avida-ED and the sections that didn't. In the future, we hope to determine if Avida-ED helped students to move away from any given common misconceptions about evolution.

BIG DATA IN BIG CLASSES: BY STUDENTS, FOR STUDENTS

Hunter Hicks

Education, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 374
Mentor(s): Tammy Long (PLANT BIOLOGY)

Citizen science is a popular method for collecting data used in ecological studies. The advantages of having many people collecting data on a larger scale can also come with disadvantages, such as having less control over how methodology is applied during data collection. This project aims to explore the quality and reliability of tree phenology data collected by students in an undergraduate biology course. "Phenology" is the study of recurrent natural phenomena, such as autumn color change and leaf fall in deciduous trees. Students in an introductory biology course (n=400) were assigned two trees on campus and each week submitted photos and estimates of percent leaf color change and leaf fall. Data were collected for 150 trees representing 10 species, with each tree sampled by at least 4 different students. My project will explore the reliability of the dataset by analyzing variance in estimation across students, by species, and over time. Our analyses will reveal the extent of agreement among students' estimates and determine whether certain species or times during the season are associated with greater difficulty in generating reliable estimates. For example, do some species show a greater range of individual variation than others? We predict that this student-centered project will produce a robust dataset conducive for a range of applications in both research and teaching. We are especially interested in applications that allow students to explore environmental and phenotypic impacts on phenology as a way of further developing their data literacy and quantitative reasoning competencies.

MIND THE GAP: KALAMAZOO COUNTY AND THE RELATIONSHIP BETWEEN SECONDARY AND POST SECONDARY INSTITUTIONS

Anna Cool

Education, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 375
Mentor(s): Matthew Grossmann (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH)

Located about halfway between Detroit and Chicago, Kalamazoo County is the home of the Kalamazoo Promise and several higher education institutions including Western Michigan University, Kalamazoo Valley Community, and Kalamazoo College. A midwestern college

town with a specific policy history in terms of encouraging college enrollment, Kalamazoo offers many lessons on the distance between education students face today. From The Kalamazoo Promise's insight in the factors beyond tuition that impact college completion to the role of dual enrollment in the county, Kalamazoo has many institutions and players that offer insight into the current state of the secondary to post secondary gap. Through interviews with stakeholders in the county and in depth analysis of past scholarship, this research examines the gap between secondary and post-secondary institutions and the policies that have been put forward to bridge this divide in Kalamazoo County. This research provides a local example of education policy to better understand the factors influencing students and families today.

EXAMINING HOW TEACHERS BOTH SUPPORT AND UNDERMINE STUDENTS' SELF-EFFICACY

Becca Koskiewicz, Daijin He, Danielle Berry
Education, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 376
Mentor(s): Harmony Murray (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Jennifer Schmidt (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Lisa Linnenbrink-Garcia (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Pei Pei Liu (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Stacy Priniski (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Stephanie Shin (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

Among the many motivational constructs, self-efficacy (i.e., a student's belief in their ability to successfully perform a task) is one key factor in promoting student learning and academic performance. The current literature on self-efficacy indicates that teachers play a crucial role in influencing students' self-efficacy. Evidence from Self-Determination Theory and Social-Cognitive Theory suggest that there are specific teacher behaviors that may support students' self-efficacy including providing clear expectations and informational feedback, presenting challenging work, and helping students identify adaptive learning strategies. To understand these interactions, this study seeks to examine the extent to which teachers use these specific instructional behaviors to support students' science self-efficacy over the course of the semester. We used previously coded video-recorded classroom observations of two middle school science teachers who each implemented different science units that consist of several lessons. The lessons were coded based on specific instructional behaviors that can support and undermine students' perceived science self-efficacy. Coded data will be analyzed to identify specific patterns of teachers' instructional behaviors that are presumed to support and undermine students' self-efficacy. Taken together, this study highlights the importance of developing effective instructional practices that revolve around supporting students' self-efficacy beliefs. Further, the results of this study could be utilized in providing new information to teacher education programs and in supplying classroom teachers with meaningful feedback.

TRANSITION OUTCOMES AND SUPPORT NEEDS OF INDIVIDUALS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES IN MICHIGAN PROJECT SEARCH

Carleigh Lewaniak
Education, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 377
Mentor(s): Christiana Okyere (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Connie Sung (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL

EDUCATION), Cynde Josol (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

For young adults with intellectual and developmental disorders, gaining and maintaining meaningful and gainful employment after high school have trouble maintaining a position within their community. Everyone has their own path toward career development and lifelong success, yet these paths are not identical. Spartan Project SEARCH offers on campus mediation for individuals who may require an alternative path toward career development. The interns that partake in this year-long program learn skills and have real-world placement options so that they can integrate themselves into the world of competitive job placement. Six guardians along with their youth were recruited to participate in an interview process detailing their experiences and benefits drawn from Spartan Project SEARCH. With Project SEARCH at Michigan State University, it was found that individuals with intellectual and developmental disorders benefit from skill development, employment support, transitioning into employment along with the overall impacts of employment. While our findings have been supportive, future research is necessary in order to strengthen employment-related support services for youth after graduating from Project SEARCH.

SURVEY PARTICIPATION, TYPES OF INCENTIVES, AND DEMOGRAPHIC INFORMATION AMONG ENGINEERING COLLEGE STUDENTS

Benjamin Hickey, Sawyer Perpich
Education, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 378
Mentor(s): Amalia Lira (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Daina Briedis (ENGINEERING DEAN), Goun Choi (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Lisa Linnenbrink-Garcia (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), S. Patrick Walton (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Stacy Priniski (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

Recruiting participants is a vital component of psychological research because broader participation increases the representativeness of the sample and, in turn, confidence in our findings. Many studies have analyzed the most effective methods of gaining college participants, concluding that monetary incentives and in-class credit are among the most persuasive offerings. Additionally, studies have found differences in the extent to which students of different racial and gender groups participate in experiments. These findings suggest that it's important to consider both the demographics of your sample and types of incentives to ensure that college samples are representative of the growing diversity of student bodies. Our study expands on prior work by considering multiple demographic groups (gender, first-generation status, and race/ethnicity) to examine rates of participation as a function of incentive type, as well as whether students completed all or only part of the survey. First-year engineering students were recruited (using either extra credit, course credit, or monetary compensation as incentives) to participate in an online survey at a large public Midwestern university. The sample consisted of 24% females and 18% first-generation students. In terms of race, the sample included 0.6% Native American, 0.2% Native Hawaiian, 21% Asian, 6% Black, 69% White, and 4% Latinx. The data will be analyzed using chi-square tests of independence. Analyzing the participation levels of students who have been offered different incentives based on demographic factors will give valuable insight to researchers aiming to recruit a large, diverse sample, especially in a college setting.

CORRELATIONAL ANALYSIS OF ADULT MEAN LENGTH OF UTTERANCE AND THE PERFORMANCE OF CHILDREN WITH AUTISM ON THE MULLEN SCALES OF EARLY LEARNING

Sarah Palmer
Education, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 557
Mentor(s): Joshua Plavnick (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Sarah Byrne (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

A positive relationship has been found between the number of words children are exposed to and their cognitive development. However, there is a lack of research on how the complexity of words, measured in morphemes, a child is exposed to is related to their cognitive development. The purpose of this study was to assess the relationship between the average number of morphemes in a sentence, or mean length of utterances (MLUs), a child with autism spectrum disorder (ASD) is exposed to and their performance on the Mullen Scales of Early Learning (MSEL). A correlational analysis was used to evaluate the relationship. The participants included both the children with ASD and adults in their classrooms whose MLU was collected for the study. Thirty-five children ages 2 to 5 years old diagnosed with ASD who attended the Early Learning Institute (ELI) participated in the study. The adults in their classrooms were teachers that implemented behavioral analytic instruction in a one-to-one format. This study compared MSEL scores, collected yearly to measure overall cognitive functioning of each child, to Language Analysis Environment System (LENA) data collected within one month of their MSEL administration. The LENA data provides numerical reports on adult MLU. The LENA digital language processor is a small audio recording device that is placed inside a front shirt pocket worn by each child to ensure the speech used by the participants in this study was unrehearsed and representative of their typical daily language. Results and implications will be discussed.

"WHAT DO YOU WANT ME TO DO?" FACULTY PERSPECTIVE ON ULA TIME USAGE IN LYMAN BRIGGS COLLEGE CHEMISTRY COURSES

Madeline Shank
Education, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 558
Mentor(s): Corbin Livingston (CHEMISTRY), Rachel Barnard (LYMAN BRIGGS COLLEGE)

The two overarching goals of this study are to better understand the motivation and time usage of chemistry undergraduate learning assistants (ULAs) in Lyman Briggs College (LBC). ULA time usage was surveyed from the student, faculty, and ULA perspectives. The survey asked respondents to rank various instructional practices on a scale of "no" to "high" portion of time. Instructional practices that were listed on the survey included approaches such as listening to a question from a student, open dialogue (no individual person controls the conversation), and not interacting with students. This presentation will focus on the faculty perspective. We probed the following questions: (1) Which practices were most frequently listed by the chemistry faculty as instructional practices that the chemistry ULAs should do in lab or recitation with a "high" or "low" proportion of their time? (2) Are there patterns in how many practices individual faculty list as practices that chemistry ULAs should do in lab or recitation with a "high" proportion of their time? Within those groups, are there patterns of which practices appear more or less frequently? The goal of this part of the research project is to clarify how faculty members expect their ULAs to spend their time in both lab and recitation settings. Preliminary results will be presented.

STUDENT POPULATIONS AND DISTRICT SIZE COMPARED TO AVAILABLE SPEECH LANGUAGE PATHOLOGISTS

Mackenzie Freeman, Sydney Padgett
Education, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 559
Mentor(s): Eric Hunter (COMMUNICATION ARTS AND SCIENCES), Mark Berardi (COMMUNICATIVE SCIENCES AND DISORDERS)

Schools are required by law to provide speech and language services to qualifying students. Schools are also required to report the number of students who use these services. To better understand the effects of district size we sampled six schools from three different population ranges (9,000-11,000, 17,000-21,000, 118,000-673,000). Using data from the Michigan Department of Education this study compared the available number of SLPs to overall caseload and school district size. Analysis resulted in a ratio of speech pathologist to student client count. By bringing these data counts together, caseloads of speech pathologists can be compared to district size to see if the amount of students in the district who are labeled as speech and language impaired far exceed the number of available speech pathologists. This data collection leaves the door open for more work on optimum caseloads for school speech pathologists.

EXPLORING THE IMPACT OF FIRST-GENERATION STATUS ON STUDENT EDUCATIONAL ASPIRATIONS THROUGH THE LENS OF MASTERY GOAL ORIENTATION

Aubrey Sneed, Rae Smith
Education, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 560
Mentor(s): Alexandra Lee (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Garam Lee (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Lisa Linnenbrink-Garcia (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Stacy Priniski (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

Higher education is believed to lead to increased opportunity and social mobility in the United States (Cary, 2004), the focus of the current study is to examine factors that may enhance students' persistence in higher education. First-generation college students (i.e., neither of a student's parents have attended college) may encounter more challenges in completing college, and pursuing post-baccalaureate education (Choi, 2001; Tate et al., 2015). This study seeks to understand the relation between first-generation status and students' educational aspirations (i.e., how far students would like to go in school). Specifically, we are interested in the role that mastery goal orientation might play in determining first-generation college students' educational aspirations. Mastery goal orientation is an adaptive pattern of learning, where the student's focus is on mastering new material rather than performing well in comparison to others (Dweck, 1986). We chose to examine mastery goal orientation specifically because previous research suggests that this motivational construct promotes persistence in education (Dweck & Leggett,1988; Elliott & Dweck, 1988). In the current study, we examine whether: (1) there is a relation between first-generation status and educational aspirations, and (2) this relation, depends on students' level of mastery goal orientation. Students (N = 1,741; 57.4% women, 11.2% underrepresented minority, 11.9% first-generation college students) were recruited from first-year chemistry courses. Our findings may indicate a need to foster mastery goal orientation within students generally, and first-generation college students, more specifically, in order to promote their academic success and educational aspirations.

ONLINE TRAINING FOR PARAEDUCATORS TO IMPROVE COMMUNICATION SUPPORTS FOR YOUNG CHILDREN WITH COMPLEX COMMUNICATION NEEDS

Alanna Desibour, Dana Decarteret

Education, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 561
Mentor(s): Sarah Douglas (HUMAN DEVELOPMENT AND FAMILY STUDIES)

In educational settings across the U.S., paraeducators are the primary communicators for children with complex communication needs (Chung et al., 2012). Although federal laws require paraeducator training and supervision (U.S. Department of Education, 2005), insufficient training still prevails (Jones, Ratcliff, Sheehan, & Hunt, 2012). This results from a lack of expertise in this field, lack of preparation for teachers, frequent paraeducator turnover rates, and inadequate administrative support (Douglas, Chapin, & Nolan, 2016; Giangreco, Broer, & Edelman, 2002; Giangreco, Edelman, & Broer, 2003). To help combat this problem, we obtained a federal grant from the United States Department of Education to create an online communication partner training for paraeducators. Prior to each study, materials were presented to an expert and educator panel for review, and the feedback was incorporated into the training materials before being tested. Phase 1 included development and testing of paraeducator training materials using a repeated staggered case study design. Data were collected regarding paraeducator implemented communication strategies and child communication skills. Findings indicate that the online materials can successfully train paraeducators, which thus increases child communication and use of AAC. Phase 2 of the project included providing teachers with POWR and POWR+ strategies so that they can better support the paraeducators in the classroom. This included staggered completion of the training with a pre-post assessment to measure knowledge gains for teachers. Results from the study will be presented with implications for communication partner training approaches.

WORD AND SENTENCE LEVEL ERRORS: ARE THEY GOOD INDICATORS OF A STUDENT'S WRITING ABILITIES?

Sam Bourgeois, Sydney Aldridge

Education, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 562
Mentor(s): Adrea Truckenmiller (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION), Amna Agha (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

Special education teachers use curriculum-based measurement (CBM) to regularly monitor their students' progress in reading, math, and writing and teachers use that information to inform changes in instruction for their students (Deno, 2003; Stecker, Fuchs, & Fuchs, 2005). For reading and math, teachers analyze student errors on CBM and use those errors to inform instruction (e.g., Hunley & McNamara, 2010). For CBM in writing, there is little research to validate if errors on CBM writing are indicators of students' abilities in areas that are important for writing development. The purpose of the current study was to evaluate the concurrent and discriminant validity of errors from CBM writing with measures of skills that are thought to be important for writing development. The current study asked 343 students in grades 3, 5, and 8 to complete a CBM writing task that aligns with middle school expectations. This CBM writing task previously demonstrated high levels of validity with the end-of-year state test (Truckenmiller et al., 2019). The current study extends the previous work by evaluating how students' errors were related to performance in other writing abilities. It was hypothesized that word level errors would be more related to students' performance on the Test of Written Language (TOWL; Hammill & Larsen, 2009) spelling & vocabulary, whereas sentence level errors would be more related to TOWL Punctuation and

Sentence Combining. Results mostly supported the hypotheses with some variation by grade level.

TEACHER RETENTION: A RELATIONAL PERSPECTIVE

Eric Moser
Education, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 563
Mentor(s): Aaron McKim (COMMUNITY SUSTAINABILITY)

The sustained shortage of school-based agricultural educators necessitates novel research into variables impacting teacher career commitment. In the current study, a previously unexplored variable in the prediction of career commitment within school-based agricultural education was considered, teacher connectivity. Four elements of teacher connectivity (i.e., within school, other SBAE teachers, curricular, and community) were analyzed in relation to career commitment among a national sample of school-based agricultural educators. Findings revealed teachers perceived the highest levels of connectivity to their curriculum and other SBAE teachers with the lowest levels of connectivity being within their own school, to other content area teachers and administrators. Using multiple linear regression, the four elements of connectivity predicted 12% of the variance in career commitment. School connectivity and SBAE teacher connectivity were identified as statistically significant, positive predictors of career commitment. Findings are discussed using the Relational Theory of Working with recommendations emerging for structuring teacher onboarding programs, increasing teacher mentoring efforts, and empowering teachers to engage in interdisciplinary lesson planning. Further, authors provide recommendations for continued scholarship exploring teacher connectivity and career commitment within school-based agricultural education.

LONGITUDINAL STUDY OF CAUSAL MECHANISTIC REASONING IN TRANSFORMED AND TRADITIONAL ORGANIC CHEMISTRY COURSES

August Jarzambek
Education, Oral Presentation
Section: 4, 9:00 AM
Presentation Number: 887
Mentor(s): Melanie Cooper (CHEMISTRY)

Studies have shown that students struggle to draw organic reaction mechanisms and understand their meaning. They struggle to use chemical principles such as electrostatic interactions and structure property relationships to explain chemical reactivity. We suggest that engaging students in causal mechanistic reasoning about chemical reactions is key for deep understanding. A causal mechanistic response reasons about the cause bringing about a specific effect and the entities responsible for the process at the scalar level below. In this case, the electrostatic attraction between the two molecules is the cause and the electron movement forming and breaking bonds is the mechanism. Student mechanistic drawings and written explanations for the reaction of I- and (CH3)3CBr were collected from students enrolled in a transformed organic chemistry course and compared to those enrolled in a traditional organic chemistry course. The analysis of these explanations and drawings will be presented.

ASSESSING INTEGRATED LEARNING THROUGH AAC&U VALUE RUBRICS

Noelle Tucker
Education, Oral Presentation
Section: 4, 9:15 AM
Presentation Number: 888
Mentor(s): Jennifer Rivera (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

The effectiveness of integrated learning within a classroom can be captured through the assessment of student reflection. By utilizing the AAC&U value rubrics you can assess work efficiently and effectively. As an undergraduate researcher who has worked on assessing hundreds of student reflections dating back from 2015, I have been able to lead professional development for the faculty instructing courses requiring integrated learning reflections. Within this evaluation process, students can express their voice in a variety of different formats and media, without the restrictions of a typical reflection process. While most standard student reflections typically end up summative, repetitive, and forced, reflections that center around integrated learning empower students to take control of their learning in unique and personal ways.

MAKING AN INCLUSIVE SPACE FOR INTERNATIONAL STUDENTS

Apichaya Thaneerat, Juhua Huang, Ky Chimrak, Ziqi Tong
Education, Oral Presentation
Section: 4, 9:30 AM
Presentation Number: 889
Mentor(s): Cheryl Caesar (WRITING, RHETORIC, AND AMERICAN CULTURE)

International students often encounter a difficult time being in class with unfamiliar environment. It has been a problem not only for the international students, but also the instructors who would like to help their students enjoy and benefit from learning in their class. Helping the instructor and student working together to complete the education process successfully is what we focus on. Our team have joined a faculty group to discuss in-class problem of international student. We will draw on survey and interview data to create a video to help the instructors understand international students' perspective and avoid the linguistic barrier in face to face and online classes.

TRANSFORMING TEACHING THROUGH REFLECTIVE WRITING

Ashley Siwek
Education, Oral Presentation
Section: 4, 9:45 AM
Presentation Number: 890
Mentor(s): Denise Acevedo (WRITING, RHETORIC, AND AMERICAN CULTURE)

Transforming Teaching Through Reflective Writing Experiences (TTTRWE) was designed to help faculty participants identify and bond with their authentic personal and professional selves through collaboration, reflection, and writing. I joined the TTTRWE team during their third year together. Before I joined the team, they had already published two pieces of literary work. Joining a group that had been working together for awhile as well as had already developed strong connections, was difficult at times. But, as a group, we were able to work together and create a project that we all could be proud of. As the Undergraduate Research Assistant, I helped with research when needed and created/maintained a project website as well as other social media accounts. During my presentation, I will discuss my role as an undergraduate research assistant for Dr. Acvedo, how I was able to make her visions a reality, and how this opportunity helped me grow personally and professionally (what I took out of this opportunity).

ALIENATION AND ISOLATION OF MINORITY STUDENTS: DE FACTO HOUSING SEGREGATION AT MICHIGAN STATE UNIVERSITY

Jasmine Jordan
Education, Oral Presentation
Section: 4, 10:00 AM
Presentation Number: 891
Mentor(s): Terry Flennaugh (TEACHER EDUCATION)

This oral presentation concerns the distribution of minority students among the dormitories of Michigan State University. For a school like Michigan State University, which requires all freshmen to live on campus, experiences inside of the dorms will have a significant impact on students' welfare and their overall attitudes towards their university. The racial composition of these dorms may affect the wellbeing of those who live there as Black and LatinX students who choose to go to Predominately White Universities/Institutions (PWIs) routinely face challenges associated with their minority status, particularly related to feelings of isolation and alienation. There is a widespread impression on MSU's campus that certain dorms have higher proportions of African American and other minority students than others. Ascertaining if this is actually the case is important because it may shed important light on how integrated minority students are and how they feel about living in predominantly white versus disproportionately non-white dorms. Given the tight relationship between housing and welfare, this research strives to answer the following questions: 1) Are there a disproportionate number of Black and LatinX students in specific dorms at MSU? 2) if this is the case, how can we explain this pattern? 3) what are the possible effects on minority students with respect to feelings of isolation and alienation of being concentrated in certain dorms? And 4) what solutions have other universities devised that MSU might emulate so as to reduce isolation and alienation among minority students.

DISSECTING THE HIGH SCHOOL HISTORY TEXTBOOK: THE ERASURE OF STRUCTURAL RACISM AND OPPRESSED VOICES

Erykah Benson
Education, Oral Presentation
Section: 4, 10:15 AM
Presentation Number: 892
Mentor(s): Heather McCauley (SOCIAL WORK), John Waller (HISTORY)

This study aims to investigate how historical narratives of the Civil Rights Era are presented in high school history textbooks through a visual and textual content analysis of the book Visions of America: A History of the United States. This research aims to identify the prevalence of the master narrative in K-12 history education curriculum, which normalizes White privilege while erasing structural racism. Overall, previously held theories that identify the dominance of the White male perspective in history education materials (e.g. curriculum, textbooks, and extra learning materials) are held consistent in this study both visually and textually. Further examinations of the text indicate that the discussion of racial inequality is intensely focused on the legislative and judicial milestones of the classical Civil Rights Movement, with a complete lack of direct examples of structural inequality such as redlining and inequities in health, education, and employment.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS

PLA RECYCLING VIA THERMODEPOLYMERIZATION

Nicole Mancina
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 107
Mentor(s): Mo Alhaj (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Ramani Narayan (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

Poly(lactide) (PLA) is a bio-based, biodegradable polymer that has been used in widespread commercial and industrial applications. Known for its biodegradable behavior, PLA is composted in a two-step process, disintegration and biodegradation, where the polymer chains are split apart into lactic acid; natural organisms then metabolize the lactic acid to

produce carbon dioxide and water. However, there are limited composting facilities due to the specific conditions required within the process. In addition, there is no efficient recycling method for PLA, and it must be separated from other plastics for end use. Researchers have studied the unique chemical behavior behind PLA in that it undergoes a reversible reaction. Thermodepolymerization of PLA occurs at temperatures above melting in order to convert the polymer back to lactide. The Biobased Materials Research Group (BMRG) has developed an efficient method to recover lactide from PLA waste via thermodepolymerization. The reaction was carried out at 200º C, and stannous octoate was added as a catalyst at 0.1 wt% due to its low toxicity, fast reaction rate, and economic benefit. Greater than 50% recovery of lactide from PLA waste was achieved with this method based on mass balance. Verification of pure lactide was obtained via differential scanning calorimetry (DSC) and gas chromatography (GC), whereas optical purity and isomeric composition was analyzed via polarimetry. The next step of this research is to scale-up PLA recycling in an extruder, where PLA can be depolymerized to lactide and put through an additional feeder to polymerize again for application use.

FATE OF SO-CALLED BIODEGRADABLE POLYMERS IN MARINE ENVIRONMENT

Melissa Joslyn
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 108
Mentor(s): Apoorva Kulkarni (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Ramani Narayan (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

The disintegration of plastic debris into microplastics and their accumulation in the world's oceans and freshwater (FW) ecosystems have raised concerns. Biodegradable polymers, such as polylactic acid (PLA), have not attracted the main attention as sources of microplastics due to the limited use of these polymers and the common misconception that they degrade under any environmental conditions. However, biodegradable polymers degrade only under certain conditions (e.g. temperature). Studies for determining marine biodegradability are done at 25-300C. However, almost 90% of the ocean water is at temperatures between 0-40C. Thus, the rate of biodegradation will be very low and will exist in the ocean environment longer. Therefore, just because they are termed as "biodegradable polymers" does not rule out their potential contribution to environmental contamination. The objective of this research is to explain the biodegradation process and to create a method of measuring the extent of biodegradation of various polymers in an aqueous environment. Currently, we are testing for the biodegradation of two polymeric samples and using cellulose as a reference at two different temperatures- 10 and 300C. The amount of carbon dioxide evolved each day is measured and is used to calculate percent biodegradation of material. The material is biodegradable if it shows a percentage biodegradation of 90%. The % biodegradation data at different temperatures was compared and found that the rate of biodegradation is dependent on temperature. Future efforts will be done to quantify this dependence on temperature to estimate the environmental buildup of the polymer in low temperatures of marine environments.

CHINESE POSTMAN PROBLEM

AJ Bensman, Dannie Ward
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 109
Mentor(s): Robert Bell (LYMAN BRIGGS COLLEGE)

The Chinese Postman Problem is a classic optimization question that involves finding the most efficient route through a map of vertices (also called nodes) and edges like how a

postman must deliver to every house on each street. The goal of the problem is to find the correct sequence of edges to follow such that you cross all edges and return to the initial position with as few computational steps as possible. This problem originated in the 18th century when Leonard Euler was searching for a mathematical solution to the famous Seven Bridges of Königsberg problem. While Euler researched this topic extensively, he never proved his findings. However, his theories regarding Eulerian Circuits laid the foundations of modern graph theory and topology. An algorithm for finding such a route wasn't proved until 1871 by Carl Hierholzer who proved Euler's hypothesis. The topic was then revisited by Kwan Mei-Ko who was able to further optimize Hierholzer's algorithm. There exist multiple different variations of the core problem. For example, a graph might first need to be converted into a Eulerian graph (meaning each node must be connected to an even number of edges) using matching algorithms to duplicate specific edges. The problem can be further extended by adding a weight and direction to each edge. The problem has many real-world applications such as finding optimal Uber or snowplow routes which add additional restrictions to the problem. The focus of our research is to code a computer algorithm which finds the optimal route using python packages and principles of graph theory while exploring the project's applications to real world issues.

DISTRIBUTION OF TOPPLINGS IN ABELIAN SANDPILES

Gabi Zawodny, Jerica Tallman, Josh Adams
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 110
Mentor(s): Robert Bell (LYMAN BRIGGS COLLEGE)

Imagine a grid in the Euclidean plane: vertices are points with integer coordinates and two vertices are joined by an edge (vertical or horizontal) if the distance between them is one. Then, imagine that piles of chips have been placed on some of these vertices. Such a configuration is called an abelian sandpile. If the number of chips on a vertex is greater than or equal to its degree, then the vertex is said to be unstable and the pile will topple, like grains of sand. When a pile topples, it shoots one chip to each of the neighboring vertices along the edges. These in turn could cause those piles to become unstable as well. When there are no more unstable vertices, then we say the sandpile is stable. The stable configurations of sandpiles are similar to fractals. We illustrate this with images that we generated using MSU's High Performance Computing Center (HPCC). Sandpiles are actively studied by mathematicians and physicists. Sandpiles have been used to model many naturally occurring phenomena, e.g. drift of sand dunes, neural activity, and earthquakes from the idea of self-organized criticality. First introduced in 1987 by Bak, Tang, and Weisenfeld, it describes a system that, as a whole, adjusts solely through local interactions as it approaches a critical point. We describe several mathematical questions that arose from our simulations. In particular, we measure the frequency of (sufficiently large) avalanches as a function of the number of chips. We also study the relationship between the number of vertices that become unstable as a percentage of a bounded grid with an edge that allows chips to fall off. Using the HPCC, we also generate images of sandpile models in 3 dimensions.

COMPARING THE STRUCTURES OF DIFFERENT SURGICAL THREADS USING A SCANNING ELECTRON MICROSCOPE

Leslie Ramirez
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 111
Mentor(s): Carl Boehlert (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Surgical thread or "sutures" are used to close injuries to the skin or other tissues. There are many different types of thread, they can be monofilament, meaning a singular thread, or they can be braided which consists of multiple threads braided together. These sutures can also be natural or synthetic and lastly, they can either be nonabsorbable or absorbable. An absorbable thread can be digested with enzymes found in the body, however nonabsorbable sutures cannot and will need to be removed. All these threads work differently and aren't all used on the same type of wound. A Scanning Electron Microscope (SEM) emits electrons at a sample which in turn will transmit signals back that contain information about the samples' surface topography. In conjunction with the SEM, an Energy Dispersive X-Ray Spectroscopy (EDS) can be used to determine the chemical composition. Looking at the structure at the microscopic level will allow for a better understanding of the differences between the types of threads. Testing for what each thread is made up chemically can be used to explain why the material is digested while others aren't. Understanding what and how these surgical threads work can help in determining if a specific type is better to use than another. This can improve a patient's comfort and reduce the risk of infection or prevent further damage to the injury. Advancing medicine is crucial as it has increased our life expectancy and improves our quality of life.

ISOLATING AND DETECTING THE PRESENCE OF FOODBORNE PATHOGEN E. COLI IN PRODUCE USING MAGNETIC NANOPARTICLES

Zach Tonnerre
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 112
Mentor(s): Evangelyn Alocilja (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Despite all the regulations regarding food quality, foodborne illnesses are still ever pervasive. Within the United States alone, an estimated 48 million people get sick from foodborne illness, resulting in 130,000 hospitalizations and over 3,000 deaths every year. This remains an increasingly prevalent threat within developing countries, with approximately 600 million people falling sick from foodborne illness, and 420,000 people dying annually. As such, there is a need for testing methods to quickly and accurately detect the presence of dangerous pathogens on food, as a select few strains cause a majority of these foodborne illnesses. This research seeks to use magnetic nanoparticles to rapidly isolate and quantify these pathogens on fresh produce. 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 measurement of bacterial content. The process begins by exposing fresh lettuce or spinach to pathogens, in this case E. coli, then grinding it down to a liquid. The mixture is then exposed to magnetic nanoparticles. Subsequent plating on a species-selective media allows for specific identification and measurement of bacteria through color-coded growth. Furthermore, this represents a method of testing that is cheaper than most methods currently available, while allowing more versatility in testing. Previous testing with E. coli has proven effective, which proves promising for its use in detecting foodborne diseases.

DESIGN AND ENGINEERING OF STARCH BASED BIOFOAM MATERIALS USING REACTIVE EXTRUSION TECHNOLOGY

Jakob Emrich
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 113
Mentor(s): Apoorva Kulkarni (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Ramani Narayan (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

Current waste disposal habits and methods lead to many products being disposed of improperly. As a result, biodegradable replacements for LDPE and Polystyrene are highly sought after. Benchtop reactions have proven the viability of starch-based foams for a variety of applications. However, limited production of such foams hinders the breadth of implementation. Reactive extrusion allows for the mass production of starch-based foams, a biodegradable product useful for packaging, insulation, food, and biomedical applications. Notably, research has shown the value of starch-based foams as hemostatic agents in the wound care of traumatic injuries. Chitosan, a derivative of the second most abundant polymer chitin, has unique physicochemical and biomedical properties which make it useful for hydrogels, films, and sponges. Cationic chitosan is known to form crosslinking with starch to form an insoluble polyelectrolyte complex. In the present work, insoluble chitosan/starch foams were prepared via reactive extrusion using water as a physical blowing agent. Additives like talc, polyvinyl alcohol (PVOH), polyvinyl butyraldehyde (PVB) were used for fine-tuning of foam properties like density and cellular size. A screw configuration made up of 3 kneading sections was found to be the most effective. Efforts will be made in future work to optimize the foam properties for wound care applications.

WHAT AM I WEARING?

CJ Whitford
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 275
Mentor(s): Carl Boehlert (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

In 2014, A study done by the University of Connecticut showed that there are over 250,000 tons of plastic afloat at sea. As plastic waste and global warming continue to be a concern for the globe, there is an effort to develop more sustainable methods of living. One of the efforts to become more sustainable is to create clothing from recycled plastics, such as bottles and bags. Some fabrics like polyester and nylon are man-made synthetic fabrics that are composed of plastics and are used to make activewear and swimwear for their elastic and absorbent properties. With the rise of efforts to become more sustainable, companies like Nike and Adidas have developed activewear products that use recycled plastic. Nike also claims that 75% of their products are made from recycled plastic and that no other company used more recycled polyester than Nike. For my project, I looked at the different fibers used to make clothing and see how they compare with each other using a Scanning Electron Microscope (SEM). Using the SEM I was able to view these fabrics with magnifications with a scale bar of 2um and be able to discover what elements they are comprised of. I used a cotton t-shirt as a control group which is a material universally used for shirts. Then I will look at polyester, polyester cotton blends, and look at shirts that are made of recycled plastic water bottles to see how each of them compare at a microscopic and molecular level.

INVESTIGATING DIAMOND DEFECTS WITH QUANTITATIVE BIREFRINGENCE

Benjamin Farris
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 276
Mentor(s): Elias Garratt (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

Lab-grown diamonds are candidate materials for several emerging technologies, including next-generation high-power electronics and quantum information technologies like qubit registers. These diamonds can be grown using high-temperature high-pressure (HTHP) synthesis or chemical vapor deposition (CVD). However, defects in the diamond crystal structure can form during growth due to unknown or uncontrolled process conditions,

impacting its performance. To better understand defect formation in diamonds, the Fraunhofer USA Center for Coatings and Diamond Technologies (Fraunhofer CCD) is developing a quantitative birefringence setup capable of imaging these defects. While a flawless diamond will transmit light normally, crystal defects in the diamond exhibit birefringence, in which incoming light is split into perpendicular polarizations. By measuring the different polarizations transmitted through the diamond, the birefringence can be mapped across the sample, revealing crystal defects and offering clues about their formation. To improve accuracy, the measurement process is automated using high-precision servo motors, which are controlled via a Python user interface. We will present progress on this instrument development to date, as well as initial results on the birefringent properties of diamond grown at MSU/Fraunhofer CCD.

MOTION ANALYSIS OF OCTOPUS ARM USING THE REVOLUTIONARY DEEP LAB CUT AI APPROACH

Tyler Vanburen
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 277
Mentor(s): Galit Pelled (BIOMEDICAL ENGINEERING)

Our lab is performing research with the octopus bimaculoides to obtain motion capture data for the development of next generation prosthetic devices. The octopus was chosen as the animal model due to its unique physiology where its limbs are decentralized from its brain and has a multitude of different receptors in its arms such chemoreceptors and taste receptors. To develop a model of how the octopus controls its arms, both motion capture and electrophysiology will be done to understand the intricate neurological network within the animal. My part in the project focuses on the use an innovative tool called Deep Lab Cut (DLC) to track and predict the octopus' movements without the need for markers and with very little guidance from the user. DLC is used to track how an octopus reaches for and grabs onto an object, in our case crabs. Doing this, the recorded motions will be analyzed and projected onto a robotic model to create networks that controls prosthetics.

INVESTIGATING WHAT HAPPENED DURING THE FLINT WATER CRISIS USING SCANNING ELECTRON MICROSCOPY

Harrison Jones
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 278
Mentor(s): Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

With the Flint Water Crisis, one of the main issues that affected tons of Flint natives was the lead pipes. Due to the water from the Flint River not being properly treated, this caused the lead pipes to corrode and infect the drinking water. This project will focus on how lead reacts in different pH solutions, mainly focusing on how much the lead samples corrode in each solution. Each lead sample will be put in a buffer solution with either an acidic, neutral, or basic pH, all consisting of orthophosphate and some from of chloride, depending on the desired pH of the solution, and one sample will not be put in a solution and will be used as a basis of comparison regarding the microstructure of each lead sample. The change in microstructure of each lead sample will be analyzed using Scanning Electron Microscopy (SEM), and the effects of corrosion on the chemical composition of each lead sample will be examined using Energy Dispersive Spectroscopy (EDS). For the results, the examinations of the change in chemical composition of the lead samples will be evaluated using charts and graphs along with literature findings in order to compare the amount of lead that corroded from each sample from this experiment and other similar experiments, and the analysis of the

change in microstructure of the lead samples will be shown using pictures from the SEM to compare how much each sample's microstructure changed after being put in each solution.

FREEZING AND THAWING FACILITATE THE RELEASE OF SOLUBLE PHOSPHORUS FROM COMMON COVER CROPS IN COLD CLIMATES

Lindsey Hassel, Rachelle Crow
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 279
Mentor(s): Steven Safferman (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Cover crops are considered best management practices for soil erosion reduction, nutrient retention, and soil health improvement. An emerging area of research surrounds the potential release of soluble phosphorus from cover crops in cold regions where freeze-thaw cycles are frequent in winter. This study aims to investigate the phosphorus release from common cover crops in Michigan, including red winter wheat (Triticum aestivum), annual ryegrass (Lolium multiflorum), and red clover (Trifolium pratense), upon exposure to varying numbers of freeze-thaw cycles at two growth stages. By determining the release of phosphorus from roots and shoots, we expect to observe that the younger cover crops exposed to the highest number of freeze-thaw cycles release the most phosphorus, with more phosphorus released from the roots. This study will provide insight to the effect of cover crops on nutrient management in cold regions, and its results will help better develop cover crop practices to maximize their agronomic and environmental benefits.

A PHASE-FIELD MODELLING APPROACH TO THE DECOMPOSITION OF METHYLAMMONIUM LEAD IODIDE PEROVSKITE

Douglas Heine
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 280
Mentor(s): Hui-Chia Yu (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING)

Methylammonium lead iodide perovskite (MAPI) is a semiconductor material considered promising for use in photovoltaics due to its favorable bandgap, long charge carrier lifetime and high power conversion efficiency. However, the deployment of MAPI solar cells is inhibited by the material's instability when subjected to heat, light and moisture. Therefore, it is of great practical interest to develop an understanding of how this material degrades in order to develop methods of stabilizing it. A phase-field computational model was developed in order to simulate the decomposition of MAPI over a range of temperatures and pressures. This model was formulated according to quasi-equilibrium thermodynamics, using quantities derived from density functional theory (a computational quantum mechanics method) as implemented in the Fritz Haber Institute ab initio molecular simulations (FHI-aims) software package. Results will be discussed.

IDENTIFYING A REDOX COUPLE FOR NANOSCALE ELECTROCHEMISTRY THROUGH ELECTROCHEMICAL DEGRADATION

Carolina Carbray
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 282
Mentor(s): Alex Mirabal (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Scott Calabrese Barton (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

Atomic Force Microscopy based Scanning Electro-Chemical Microscopy (AFM-SECM) enables the study of electrochemical reactions by monitoring reactants and product concentrations at

nanometer length scales. Frequently, oxidation-reduction (redox) couples are employed to enhance reaction rates. We analyzed, over a range of experimental conditions, the chemical stability of three redox couples: Ruthenium Hexamine Trichloride (RH), Ferrocene Methanol (FM), and Methyl Viologen (MV). When these compounds degrade, they impact the performance of the working electrode for AFM-SECM. Chemical degradation was monitored using Cyclic Voltammetry (CV). The effect of oxygen and light on redox couples was measured by comparing CV data from samples exposed to each condition with those that were in the absence of light and/or oxygen. Oxygen was removed from solution by bubbling with inert gas, such as argon. MV was found to be stable in the presence of light and oxygen, but was unusable because it turned blue when reduced, thus blocking the laser sensor in SECM-AFM. RH was relatively unstable and produced visible contamination on the working electrode during CV. FM appears to have good stability but has low solubility and requires purification before use. Our future work will focus on redox couples that satisfy all of the above criteria.

DETECTING IMPAIRED DRIVERS THROUGH NEAR INFRARED SPECTROSCOPY AND MACHINE LEARNING

Adam Speaks, Christian Stack, Justin Bennie
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 283
Mentor(s): Zhaojian Li (MECHANICAL ENGINEERING)

Every day it is estimated that 29 people in the United States die from vehicle crashes that involve an alcohol impaired driver. This project aims to create a solution to this problem by using near infrared spectroscopy and machine learning techniques to determine if someone has alcohol in their blood. A very small spectrometer takes a reading of the user through shining a light at their hand and collecting the transmittance of wavelengths from the reflection of the hand in a given range. Supervised machine learning will then use old, labeled, spectroscopy graphs to determine the probability that a user has alcohol in their system. Successfully creating this algorithm allow for a cheap spectrometer to be placed in a steering wheel sleeve and conclude whether the driver has been drinking. This project aims to investigate if this technique is possible.

ANALYSIS OF WATER ADSORPTION ON ACTIVATED CARBON USING ANALYTICAL MODELS

Husain Alnaji
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 284
Mentor(s): Scott Calabrese Barton (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

Understanding the mechanism and kinetics of water adsorption is vital in many areas of science and technology because water is the most common solvent in nature. However, current understanding of water adsorption on carbonaceous materials is still incomplete, which motivated the development of many models that attempt to describe water adsorption. Although computer simulation models have been successfully developed to describe water adsorption, analytical models are often favored to cut down the computation time significantly. Analytical models have also the potential to measure the concentration of surface active centers with different heterogeneities and functional groups. The mechanism of water adsorption on carbonaceous materials is influenced by the weak carbon-water attractions and the strong water interactions, which results in the formation of multiple layers of water molecules. It is complicated further by the heterogeneity of adsorption centers, which leads to enhanced water adsorption. Additionally, water

adsorption on porous carbons strongly depends on the pore size distribution on the surface due to the phenomenon of capillary condensation. To better understand the mechanism and kinetics of water adsorption, the adsorption isotherms of six different samples of activated carbon were measured using Micromeritics Accelerated Surface Area and Porosimetry System (ASAP). The adsorption isotherms curves were then fitted to six adsorption models to determine the parameters in each model. The physical parameters were then analyzed to examine the possibility of measuring surface active centers on the activated carbon.

THE FRACTOGRAPHY OF AN IPHONE 5 GLASS SCREEN

Juliana Malinowski
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 285
Mentor(s): Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Fractography is a method used for determining how a material failed by qualitatively analyzing the fractured surface. Using a scanning electron microscope (SEM), the microstructure of a failed glass iPhone screen was observed and analyzed. Several samples of glass were obtained near the origin of cracking from an iPhone 5 SE. For preparation, the specimens were made conductive with a coating of platinum so they could be imaged in the SEM. Fracture surface topographical features, such as crack patterns, were identified from the SEM images.

HOW AUTOGRADING AFFECTS STUDENT LEARNING OUTCOMES AND GRADING EFFICIENCY

Claudia Chen, Trevor Franklin
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 286
Mentor(s): Dirk Colbry (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING)

In 2016, MTH 314 was updated to use Python and Jupyter notebooks to teach concepts and practical applications in Linear Algebra. This course has been highly successful with around 30 students enrolled each fall and spring semesters. As of spring 2020, MTH 314 has a larger section of over 50 students. The success of MTH 314 has led to making the course a requirement for multiple majors including Physics and Computer Science. In order to accommodate the higher demand, there are plans to scale up the size of this course to 200-400 students per semester. With this increase in students comes a need to grade more efficiently and provide meaningful feedback to students in a timely manner. In this research, we are exploring autograding systems to aid in the evaluation of class assignments. This is important to study because courses that use Jupyter Notebooks often don't have much feedback from the notebook about why an answer is wrong. The format of this class currently has 1 professor and a Graduate Teaching Assistant evaluating student's answers. This process needs to be automated to accommodate the larger section sizes in the upcoming semesters. The goal of our proposed study is to determine how autograding can help students learn course content and how it affects the speed that instructors can grade assignments.

CAPTURING MECHANICAL PROPERTIES OF VASCULAR SYSTEMS USING CARDIOVASCULAR HEMODYNAMICS SOFTWARE

Arun Kammanadiminti
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 287

Mentor(s): Seungik Baek (MECHANICAL ENGINEERING)

As vascular diseases have become more commonplace, research into curing these diseases has risen, but the technology and protocols to help researchers and doctors diagnose and design surgeries for patients has not yet been well developed. CRIMSON (Cardiovascular Integrated Modelling & Simulation) is an open source software that allows scientists to map out vascular structures by specifying centerlines, shaping the vessels, extruding them, creating a mesh around the vessels, and ultimately running fluid dynamic simulations. Pulmonary arterial hypertension (PAH) is a disease that results in elevated pressure within the pulmonary arteries. Several computational hemodynamic models have been previously made, but none have considered the effect of vessel wall deformation or have been calibrated against human measurements. CRIMSON was used to help analyze what changes in the model would better correspond to a PAH patient's actual pulmonary vasculature. The work currently being performed is to efficiently and noninvasively diagnose patients by instead utilizing CRIMSON, the High Power Computing Center (HPCC) at Michigan State University, and other predictive models by running simulations that show how a diseased vessel changes over time and affects a patient.

CARBON DIOXIDE CAPTURE FROM FOSSIL-DERIVED FLUE GAS USING LYSINE SALT SOLUTION

Annaliese Marks
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 288
Mentor(s): Sibel Uludag-Demirer (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Wei Liao (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

The objective of this study was to investigate the potential use of an environmentally friendly amino acid salt solution, containing Lysine (Lys) and potassium hydroxide (KOH), in the removal of carbon dioxide (CO2) (10% by volume) from fossil-derived flue gas. Amino acid solutions of different molarities were compared to determine the effect of amino acids with multiple amine groups on carbon dioxide absorption. The solutions were also tested on their ability for maximum carbon dioxide desorption to regenerate the solution and to collect CO2 released from the solution, which can be used as carbon feedstock to produce a value-added product such as methanol, formic acid, and other carboxylic acids. A gas wash bottle was used to run the absorption test. A continuous flow of air with 10% CO2 was pumped into the lysine salt solutions until equilibrium was established following the saturation of the solution. Desorption was carried out by boiling the CO2-saturated lysine salt solution. The measurements of CO2 in gas phase were carried out by a CO2 sensor and gas chromatography. The mass of CO2 absorbed and desorbed were calculated using a graphical method based on absorption and desorption results. The products formed during the absorption and desorption process were identified using 13C NMR to understand the reaction mechanisms.

NATURAL COAGULANTS DERIVED FROM MORINGA OLEIFERA: PHYSICOCHEMICAL PROPERTIES AND APPLICATIONS IN WATER TREATMENT

Remi Gonety
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 289
Mentor(s): Volodymyr Tarabara (CIVIL & ENVIRONMENTAL ENGINEERING)

Coagulation is one of the main unit processes used in water treatment worldwide. Natural coagulants derived from locally available plants can be cost-effective and less-toxic alternatives to inorganic salts. Coagulants derived from the seeds of the drumstick

tree, Moringa oleifera (M. oleifera), have been shown to be a promising natural coagulant. The efficiency of the extraction procedure over a range of operational parameters have been evaluated in a series of jar tests with model kaolin-in-water suspensions. Further test analyses include Total Organic Carbon (TOC) test and Laser diffraction particle size analysis (Mastersizer). The results from the experimental data collected so far show that the coagulant extraction was shown to be the most effective using 0.1 M NaCl in the extractant, giving 93.74 ± 0.22% removal of turbidity at 14.522 ±0.27 mgTOC/L of M. oleifera dosage with a residual TOC of 13.03 ± 0.22 at 30 rpm. However, if we only focus on TOC, the less residual TOC was obtained at 11.86 ± 0.39 mgTOC/L for a turbidity removal of 92.58 ± 1.02 % at 13.04 ± 0.17 mgTOC/L of M. Oleifera and 40 rpm. From the particle size analysis, it was found that flocs remaining after settling are larger than the original particles which will make filtration easier. These analyses are important for the subsequent work that will be done on this project which include studying the removal of contaminants like organics and microbes, and the removal of post-settling particles by membrane filtration.

CARBON FOOTPRINT OF THE USE-PHASE OF ELECTRIC VERSUS COMBUSTION VEHICLES OVER TIME IN THE US

Rohan Challa
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 290
Mentor(s): Annick Anctil (CIVIL & ENVIRONMENTAL ENGINEERING), Dipti Kamath (CIVIL & ENVIRONMENTAL ENGINEERING)

Transportation accounts for 29% of Greenhouse Gases (GHG) emissions in the US. Regulations are set to counter the GHG emissions by increasing fuel economies of internal combustion engine vehicles (ICEVs). Electric vehicles (EVs) are another option to reduce GHG emissions, especially given the planned decarbonization of the electric grid. As per previous studies, EVs reduce GHG emissions by 67% compared to ICEVs. However, the changing fuel efficiency and electricity grid mix can alter the relative benefits of EVs. The use phase GHG emissions of a typical 5-seater EV and ICEV from 2018 to 2030 were compared using life cycle assessment. Fuel efficiency and miles driven varied with location, as they depended on weather and type of roads driven on. To account for this variation, the current study was conducted for the US as a whole, as well as four states, namely California, Arizona, New York, and Oregon. The required fuel for ICEVs was estimated by assuming the fuel efficiency to change from 27 miles per gallon (MPG) in 2018 to 30 MPG in 2030. For EVs, electricity used per mile was assumed to be a constant, while assuming decarbonization of electricity generation mix. Preliminary results show that compared to 2018, GHG emissions of EV fuel use in 2030 reduced by 6% to 2039 kg CO2 eq, while those of ICEV fuel use reduced by 33% to 2,445 kg CO2 eq. The GHG emissions for the EV and ICEV use phase over time for the different locations will be presented.

OVARIAN TORSION IDENTIFICATION USING MACHINE LEARNED INTERPRETABLE CLASSIFICATION MODELS

Raymond Lesiyon
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 461
Mentor(s): Adam Alessio (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING)

Ovarian torsion results from obstruction of blood to an ovary due to twisting of its vascular pedicle. The common symptoms and clinical tests for ovarian torsion are relatively nonspecific making it difficult to pinpoint the conditions. Some of these symptoms are nausea, vomiting, abdominal pain and tenderness. Torsion is classically seen in women of

reproductive age, with 17% to 20% of cases occurring in pregnant women. The diagnosis of ovarian torsion involves a combination of patient's history, medical examination and color Doppler ultrasound (CDC). The criteria investigated in ultrasound imaging includes the presence of enlarged ovary, free fluid in the pelvis, lack of arterial or venous blood flow and existence of twisted pedicles (1). A delay in the diagnosis of the ovarian torsion might lead to ovary loss and additional co-mobidities. The routine analysis of patient's history and imaging data create an opportunity of exploring machine learning algorithms to identify the occurrence of ovarian torsion in the patients. This project aims to identify ovarian torsion using different machine learning algorithms and compare their performance. In an IRB approved study, data from ultrasound imaging were used with the following features; age, laterality, ovarian volume, ovarian position (whether medialized) peripheral follicles, presence of mass cyst and free fluid. Decision trees, random trees and logistic regression modules were learned based on these data sets leading to interpretable, clinically practical models for classification of the ovarian data. The project also involved the development of a nomogram for an easier visualization of the logistic regression result.

ANALYSIS OF LEAD CORROSION IN TAP WATER USING TAP WATER FINGERPRINTING AND THE COFFEE RING EFFECT

Alyssa Sanderson
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 462
Mentor(s): Rebecca Lahr (LYMAN BRIGGS COLLEGE)

Methods to detect lead in water are neither low-cost nor user friendly. Currently, tap water fingerprinting techniques are under development for low-cost, accessible analysis of elements in tap water and could be utilized to look for signs of lead leaching in water. This method makes use of a phenomenon where tap water droplets leave distinguishable "fingerprint" residue patterns after evaporation. These fingerprint patterns are formed by the physics of the coffee ring effect and can be measured with inexpensive materials, such as a jeweler's loupe ($18), pipette, and a common cell phone. However, lead occurs at much lower levels in tap water than compounds typically measured with this tap water fingerprinting technique and cannot be easily measured directly. Thus, different indicators of lead corrosion need to be considered using this technique. Two such measures are the Chloride to Sulfate Mass Ratio (CSMR) and the Langelier Saturation Index (LSI). To test tap water patterns of these two indexes, synthetic tap water mimicking Detroit tap water and Lansing tap water were created that have a range of CSMR and LSI values. The CSMR values range from 1.2 to 0.1, with lead corrosion typically occurring around 0.5. The LSI values range from -2 to 2, with 0 being the threshold for possible corrosion. By understanding the tap water fingerprints produced from a range of CSMR and LSI values, quick and simple monitoring of tap water distribution system corrosion is possible.

FRIB S800 CONTROL SYSTEMS UPGRADE

Will Chisholm
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 463
Mentor(s): Jorge Pereira Conca (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

For the last 20 years, the S800 spectrograph has been one of the cornerstone devices in the National Superconducting Cyclotron Laboratory (NSCL) at MSU. Utilized in almost 50% of the experiments run at NSCL, its success relies, to a big extent, on its capability to separate and identify light- and medium-mass recoil nuclei produced in reactions involving exotic nuclear

beams. Currently, a big part of the S800 control system interface is done through Panel Mate applications. While these Panel Mates have been in use for many years, they have become obsolete and are in need of being changed. My project involves the use of Control System Studio (CS-Studio) to upgrade the S800 control system interface. Doing this will make finding critical information easier and more centralized.

COLORMETRIC BIOSENSING OF TB DNA

Jeswin David
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 464
Mentor(s): Evangelyn Alocilja (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

As one of the leading causes of death from a single infectious disease agent, the detection of Mycobacterium Tuberculosis (TB) is extremely important to improve treatment. Colorimetric biosensing of TB DNA is a gold nanoparticle-based method that allows for faster detection of the disease, which in turn can result in more rapid diagnosis and treatment. This allows for disease control and the ability to keep the disease from spreading. It provides a safer environment for communities to inhabit. Through trial experiments, results have shown that this colorimetric technique can detect DNA in under 30 minutes. This detection method can differentiate between target and non-target DNA. This colorimetric technique uses gold nanoparticles (AuNPs) to provide a visual color differentiation between the DNAs. Detection in this manner can be provided in different environments in the world in labs or in the field. Overall, this technique does not require expensive lab equipment or technically skilled labor. Not only will this be cost efficient, but people in resource limited settings will be able to access this test, thus increasing their chances of being properly diagnosed and treated for TB. The colorimetric biosensing of DNA is a cost-effective, time efficient method and the possible applications around the world surpass current TB biosensing techniques.

UTILIZATION OF MAGNETIC NANOPARTICLES FOR EXTRACTION OF LISTERIA MONOCYTOGENES IN FOOD MATRICES

Emma Dester, Margarita Chekhova
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 465
Mentor(s): Evangelyn Alocilja (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Each year, an estimated 1,600 Americans contract Listeria monocytogenes following consumption of contaminated food. Approximately 260 of these cases end in death, making it the third leading cause of death from foodborne illness in the United States. This infection can come from many foodborne sources, including unpasteurized milk, deli meats, and raw fruits and vegetables. The purpose of this research is to develop faster and more cost-effective methods for detecting this bacterium in various food matrices before it reaches the consumer. The first step to detecting foodborne illnesses is extraction, concentration, and isolation of the bacteria. In this assay, the unique interactions between bacteria and magnetic nanoparticles (MNPs) were utilized to improve this concentration process. Incubation of liquefied contaminated food with magnetic nanoparticles was followed by magnetic separation and re-suspension in phosphate-buffered saline solution (PBS). A cost-effective and rapid method for raising bacterial concentration to a detectable level was therefore developed. This poster will present analysis of this new concentration procedure on various Listeria-contaminated food matrices. Preliminary results have shown magnetic nanoparticles are capable of concentrating Listeria by a factor of approximately 15 in pure PBS solution, with varying concentration factors when a food matrix is introduced. This process has the

potential to be applied to a wide array of food matrices and pathogens, thus enhancing the early detection of foodborne illness and preventing potential loss of life.

DEVELOPING A SMARTPHONE-BASED APPLICATION FOR REMOTE IOT SENSORS MONITORING

Kanishka Wijewardena
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 466
Mentor(s): Prem Chahal (ELECTRICAL AND COMPUTER ENGINEERING)

With the proliferation of Internet of Things (IoT) technology, there is a demand for obtaining uninterrupted information from different sensors using smartphones. This is especially important in healthcare and other sensor-based real-time smart monitoring systems. This work was developed as part of a smart mouth-placed health monitoring device, which could provide real-time information from the mouth sensor and visually display the data to users. The proposed IoT system builds upon the existing batteryless RFID infrastructure. The existing design has two communication layers 1) Sensor to RF reader communication, and 2) Smartphone to RF reader communication. A smartphone application receives and transmits data from an intermediate RF reader, which interacts with the batteryless sensors deployed in the smart mouth-placed device. The sensor to RF reader communication layer uses standard RF backscatter communication to obtain data from the sensor at the intermediate RF reader. After obtaining the sensor data at the RF reader, the reader communicates the data to the smartphone using standard Wi-Fi technology. In this project, a smartphone application was developed and demonstrated on the Android platform using Android Studio.

STUDY OF AIR FLOW AND CO2 CONCENTRATION IN AN MSU CLASSROOM

Camille Maradiagaponce
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 467
Mentor(s): Maddalena Fanelli (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Susan Masten (CIVIL & ENVIRONMENTAL ENGINEERING)

Several studies have concluded that high concentrations of carbon dioxide, CO2, in enclosed spaces contribute to lower cognitive functional performance. Proper ventilation is necessary to maintain appropriate rates of convective mixing and air quality. Estimates of pollutant concentrations in indoor environments are often based on simple mass-balances that account for net infiltration of outside air and indoor sources and sinks in completely well mixed spaces. More detailed models are needed to capture the complex flow patterns generated by different ventilation systems and the distribution of pollutants in classrooms. The purpose of this study is to begin to construct a computational fluid dynamics model to estimate CO2 concentrations across an MSU classroom. The software COMSOL Multiphysics is first used to create and validate flow through a simple air space and then applied to better understand the flow and CO2 distribution across the actual classroom. CO2 concentration data obtained in a previous monitoring study are used for reference.

AUTOMATICALLY SEARCHING ALGORITHM SPACE TO FIND SOLUTIONS FOR SCIENTIFIC IMAGE SEGMENTATION WORKFLOWS

Cameron Hurley
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 468

Mentor(s): Dirk Colbry (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING), Katrina Gensterblum (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING)

Every scientific image analysis problem is unique; some problems are simple, whereas others are complex. This research is about developing tools that will utilize genetic algorithms (GAs) to aid scientists in automatic discovery of scientific image understanding solutions. As a proof of the concept, this work demonstrates a tool that searches for image segmentation algorithms specific to a unique scientific workflow. This work presents results from a wide range of example image segmentation problems.

IT'S ALL IN THE SHOES: ANALYZING HOW SHOE COMPOSITION AFFECTS BIOMECHANICAL CONTROLS AND RUNNING PERFORMANCE

Briana Alarcon
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 647
Mentor(s): Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Most athletes around the world rely on the quality of the shoes on their feet while they perform. While shoes are meant to keep one's feet safe from debris, they also play an important factor in biomechanical control and athletic performance. As studies have suggested, proper footwear can help correct overpronation as athletes compete, therefore decreasing the risk of injury. Other studies have shown that the type of shoe worn can enhance one's performance, but with various brands and kinds of shoes advertised, it can be hard to decipher which shoes are for show and which shoes are meant to provide the best support. In order to evaluate what kind of shoes impacted runners the most there will be two methods used to objectively quantify which shoes improve comfort and performance. For starters, the composition and microstructure of the rubber outside the shoes will be examined with Scanning Electron Microscopy. Utilizing this data will provide the chemical composition of the bottoms of running shoes, which can be used to determine the weight and density of each respective shoe. Along with the images provided, a survey will be conducted to see how runners have felt about the durability and comfort of the shoe. These surveys will focus on points such as average mileage and injuries obtained while wearing the reported shoe. To determine the best running shoes, the density, durability, and comfort will be taken into account because this in effect will affect the athletes' biomechanical control and consequently their performance.

CAUSE-SPECIFIC CROP INSURANCE PRICING WITH TWO PART MODEL

Muyao Lin
Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 648
Mentor(s): Gee Lee (STATISTICS & PROBABILITY)

In the U.S., crop insurance is offered by the Federal Crop Insurance Corporation (FCIC) to protect the income of farmers against crop failure or price decline, protect consumers against the shortage of supplies and high prices, and assist businesses by providing a constant flow of farm supplies. Accurate insurance rates are required for this to be possible. In this project, we attempt to produce cause-specific insurance rates. Because certain geographical regions may be more affected by certain causes, we use the state code as a predictor for the frequency and severity of indemnities by each cause code. We utilize the premium amounts and historic indemnity amounts obtained from the United States Department of Agriculture (USDA) Risk Management Agency (RMA) in order to build and test the models. For the data analysis, we assume the loss severities are log-normally distributed, and the loss probabilities follow a binomial distribution. In order to select the explanatory variables relevant to the

prediction, we apply a LASSO penalty to the log-likelihood. This allows for a reduced set of coefficients to be estimated automatically.

RECYCLED POLYSTYRENE FOAM: POTENTIAL ADHESIVE FOR BAMBOO COMPOSITES

Kelli Weigold

Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 649
Mentor(s): Carl Boehlert (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Lawrence Drzal (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

As the human population continues to grow, the sustainability of the materials used to build our infrastructure, means of transportation, and everything around us becomes of increasing importance. Due to its high tensile strength, fast growth rate, and biodegradability, bamboo is an excellent candidate for a sustainable material with countless possible applications, from housing and transportation to toothbrushes. Additionally, expanded polystyrene foam, more commonly known as "styrofoam," is a popular choice for single-use insulating storage containers and building insulation, but lacks an effective recycling strategy. The purpose of this project is to create a useful structural material that takes advantage of the high sustainability of bamboo while combining it with an adhesive made from post-consumer styrofoam to produce bamboo composites. To assess the potential of this idea, several types of bamboo "sandwiches" were created, consisting of two layers of bamboo held together with a thin layer of polystyrene adhesive. The type and thickness of pure polystyrene adhesive was systematically investigated and a surface treatment of the bamboo that was most effective was identified. The tensile properties of each sample were measured, and fracture surfaces were analyzed using scanning electron microscopy. Once the best combination was identified, an adhesive made from recycled polystyrene foam was produced. In this presentation, the results and conclusions of the above experiments will be discussed, along with comments on possible future work.

A SYNTHETIC BREAST MODEL FOR TRAINING SURGEONS AND MEDICAL STUDENTS

Katharine Walters

Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 650
Mentor(s): Tamara Bush (MECHANICAL ENGINEERING)

The American Society of Plastic Surgeons reports that over 240,000 women received breast reduction operations for reconstructive, aesthetic, or breast hypertrophy reasons in 2016. In a breast reduction operation, a plastic surgeon must establish the topographical landmarks of the breast, remove excess skin, fat, and breast tissue without damaging the nipple or blood vessels, adjust the position of the nipple relative to the reduced size of the breast, and ensure that both breasts have the desired size and symmetrical proportions and appearance. Currently, there are no inexpensive and user-friendly devices for medical students and surgical residents to practice breast reduction operations on. The purpose of this project is to develop a breast model that can be made easily with inexpensive and readily available materials. A one-sided breast model accurately depicting the shape of the female breast was 3D printed. A series of small-scale samples of potential skin and breast tissue substance combinations were created to determine which substances most closely imitated the properties of the human breast and allowed for ease of assembly and use. Continuing work on this project is to incorporate materials into the model for the nipple and blood vessels and to establish a protocol for gathering in vivo mechanical breast tissue property data.

AN INFORMATION THEORY APPROACH TO THE STUDY OF COOPERATION

Grant Carey

Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 651
Mentor(s): Christoph Adami (MICROBIOLOGY & MOLECULAR GENETICS)

The evolution of cooperation has been traditionally understood in the context of the Price equation, which relies on the covariance of phenotypes and fitness. However, it may be possible to formulate a new theory of cooperation based entirely on information theory. In our research, we utilize evolutionary game theory simulations to study information transfer. In such simulations, we are able to establish a critical value for information transfer at which cooperative strategies develop. By varying the payoffs in the payoff table for these simulations, we are able to influence the cost and benefit ratios. Thus, it is possible to empirically generate a relationship between the critical amount of information necessary for cooperation and the costs and benefits of the behavior. From this relationship it will be possible to derive a theory that will provide a more insightful description of cooperation.

IMPACT OF DENSITY ON MAGNETIC PERMEABILITY OF 3D PRINTED ELECTRICAL STEEL

Lauren Kaliszewski

Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 652
Mentor(s): Shanelle Foster (ELECTRICAL AND COMPUTER ENGINEERING)

Additive manufacturing is an expanding field with the ability to be used for a range of applications, such as electric motors. In order for materials to be used in electric motors, the magnetic properties must be well known. However, additive manufacturing of electrical steels is an emerging field, so the relationship between the magnetic and printing process parameters is not fully understood. One of the important magnetic properties to consider is permeability because it is a measurement of how a material will respond to a magnetic field. To help with understanding how permeability is impacted by additive manufacturing, Fused Filament Fabrication (FFF), Binder Jet Printing (BJP), and Selective Laser Melting (SLM) technologies were used to produce toroidal samples for magnetic characterization. After testing multiple samples, a correlation is observed between the sample's density and it's magnetic permeability.

A STATISTICAL ANALYSIS OF ZONE EXIT STRATEGIES FOR PENALTY KILLING IN HOCKEY

Bryant Beem, Derek Lasker, Josh Pang, Matthew P. Miller

Engineering, Computer Science, and Mathematics, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 653
Mentor(s): Albert Cohen (MATHEMATICS)

The presence of analytics in hockey is growing every season. We were given the opportunity to partner with Iceberg Sports Analytics, which allowed us to use data from over 900 NHL games. One area where relatively little analytical work has been done is in penalty killing. We used our large sample size to analyze the various zone exit strategies.

FREESTANDING LAYERS OF SILICON NANOCRYSTALS: PHOTOLUMINESCENCE AND MECHANICAL PROPERTIES

Cameron Papson

Engineering, Computer Science, and Mathematics, Oral Presentation
Section: 6, 3:30 PM

Presentation Number: 751
Mentor(s): Rebecca Anthony (MECHANICAL ENGINEERING)

Silicon nanocrystals (SiNCs) have many applications in electronic devices due to their efficient and tunable optoelectronic properties. In the many methods for creating SiNCs, they are nearly always either embedded in an inorganic matrix or supported by a substrate. While this has not hindered their use in technologies such as light-emitting devices (LEDs) and solar photovoltaics, it also raises questions about SiNC properties in standalone layers. It is well-known that the local environment of nanocrystals can influence their optical properties, and many of the methods for testing the mechanical behavior of thin layers of SiNCs rely on substrate-supported techniques. Here we present our work on fabrication of freestanding layers of SiNCs, and their optical and mechanical behavior. SiNCs were synthesized in a nonthermal radiofrequency plasma reactor using silane, argon, and hydrogen gases. Transmission electron microscopy (TEM) and x-ray diffraction (XRD) measurements indicate that the SiNCs are crystalline with an average diameter of 4-5 nm. We created freestanding layers by using inertial impaction of SiNCs directly out of the reactor onto sacrificial layers, such as NaCl and sucrose. Using this technique, we deposited SiNC layers of varying thicknesses. We then liberated the SiNC layers via dissolution in water. The SiNCs, which are hydrophobic, rose to the surface of the water where we collected them. Our ongoing experiments include testing the SiNC layers' photoluminescence and mechanical properties without the support of a substrate beneath, helping to elucidate their properties as a single system rather than as a layer supported by a bolster.

BALE BED: A HYDRAULIC LIFTING MECHANISM FOR FEEDING HAY BALES

Rhett Pimentel
Engineering, Computer Science, and Mathematics, Oral Presentation
Section: 6, 3:45 PM
Presentation Number: 752
Mentor(s): Puneet Kumar (CIVIL & ENVIRONMENTAL ENGINEERING)

When managing two large herds of cows separated by 5 miles of bumpy fields and busy highways, the traditional method of hay feeding doesn't work too well. Tractors tend to be slow, high-maintenance, and inefficient in cold weather. To solve this problem, the Bale Bed was designed and built. The Bale Bed is a hydraulic hay feeder that takes the place of a flatbed on a standard pickup truck. Hay bales can be lifted, lowered, and unrolled from the comfort of the truck. The design was first modelled in CAD software, and statics calculations were used to verify component strength and function. All components were then fabricated and assembled on a customer vehicle. An electric-over-hydraulic system was designed and implemented. Several design constraints were adhered to throughout the project including cost, manufacturability, and lifting capacity. The bale bed, constructed at $7500 less than commercial options, is now used daily by the customer to load two 1200-pound hay bales, transport them at highway speeds, and feed hundreds of animals in several locations. A process that once took hours now can be completed in less than 60 minutes thanks to the Bale Bed.

COMPUTATIONAL METHODS FOR LUCAS POLYNOMIALS AND LUCAS ATOMS

Cole Degroat, Jeremy Rebenstock, Thomas Bos
Engineering, Computer Science, and Mathematics, Oral Presentation
Section: 6, 4:00 PM
Presentation Number: 753
Mentor(s): Robert Bell (LYMAN BRIGGS COLLEGE)

We apply computational methods to factor Lucas polynomials and Lucas atoms, where a Lucas polynomial is defined recursively in the variables s,t by {0}=0, {1} =1 , {n} = s{n-1} + t{n-2} for n≥2. For example {2} = s{2-1} +t{2-2} = s{1}+t{0} = s. Lucas polynomials generalize the

Lucas sequence which is closely related to the well-studied Fibonacci sequence. The coefficients of the Lucas polynomials count the number tilings of a row of n squares by 1x1 tiles (monominos) and 1x2 tiles (dominos). A remarkable property is that the Lucas polynomials factor. A Lucas atom P_n = P_n(s,t) is defined recursively as {n} divided by the Lucas atoms P_d(s,t) such that d divides n. For example, P_4 = {4} / (P_2 * P_1) = (s^3 + 2st) / (s*1) = s^2+2t. Currently, it is unknown what the coefficient of the Lucas atom count, if anything at all. We aim to unravel some of the meaning of the coefficients of Lucas atoms by using computer algebra software. Additionally, with the aid of the Online Encyclopedia of Integer Sequences, we investigate sequences which arise by evaluating Lucas atoms at special values of s and t.

HIGH POWER X-RAY DIFFRACTION FEATURE IDENTIFICATION IN STRONG NOISE

Kieran Nehil-Puleo

Engineering, Computer Science, and Mathematics, Oral Presentation
Section: 6, 4:15 PM
Presentation Number: 754
Mentor(s): Philip Eisenlohr (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

This research involves improvements on the identification algorithm of X-ray diffraction maxima previously used at Argonne National Lab's Advanced Photo Source (APS). The diffraction profile produced by the detector at beamline 34-ID-E consists of high noise images that make algorithmic detection of the positions of peak maxima difficult. This is due to the intensity of the noise in the diffraction image being of the same magnitude as some of the maxima. The proposed solution consisted of a form of pseudo-convolution triggered by a change in the distribution of pixel intensity values. The feature amplified image is then run through another algorithm that determined the most likely center of the diffraction peak. The new algorithm has outperformed the old instance in terms of quantity and positional accuracy of identified peaks. With increased performance in the peak identification algorithm, higher quality conclusions of metallic microstructures can be made.

ENVIRONMENTAL SCIENCE & NATURAL RESOURCES

META-ANALYSIS AND MAPPING OF SCHOLARLY WORK ON HYDROELECTRIC DAM RESETTLEMENT AND COMPENSATION STRATEGIES IN DEVELOPING COUNTRIES

Samyuktha Iyer

Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 131
Mentor(s): Maria Lopez (COMMUNITY SUSTAINABILITY)

Many developing countries are building hydroelectric dams claiming that they will generate more sustainable energy production. But these dams impact the people living near where the dams are situated dramatically. The construction of dams displaces people who are resettled and/or compensated due to the disruption caused by dam building. This project conducts a meta-analysis on what kind of resettlement and compensation strategies dam builders implement to better understand which strategies have been tried and which ones have been effective. The authors coded 179 peer-reviewed papers published from 1980 to May of 2018 on hydroelectric dams in developing countries and BRICS. The metanalysis was done using NVIVO software to collect data on changes to the impacted people's lifestyles and livelihoods because of the dam. The project is also looking at which scholars are doing work on how hydroelectric dams impact people in developing countries in order to map who studies resettlement and compensation strategies.

IMPROVING EXTINCTION RISK ASSESSMENTS THROUGH TREND ANALYSIS OF SPECIES-SPECIFIC TRAITS

Erika Ralston, Minali Bhatt
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 132
Mentor(s): Beth Gerstner (BIOLOGICAL SCIENCE PROGRAM), Phoebe Zarnetske (INTEGRATIVE BIOLOGY)

Biodiversity has been declining exponentially over the past century due to global changes, including climate and land-use change. Montane forests of Central and South America are especially susceptible to biodiversity loss, because they are inhabited by many specialized species. Fruit-eating or frugivorous birds are dependent on specific dietary and habitat requirements, decreasing their ability to adapt in the face of a changing environment and worsening the impact of threats on the species' populations. Many species are unable to track the changes in climate, which is compounded by lagging changes in forest distributions, rendering sensitive bird species unable to move to regions that fulfill their habitat requirements. This project aims to understand the relationship between species-specific traits and individual species' vulnerability to extinction. Using extinction threat categorization data from the IUCN Red List and compiled data on the diet breadth, habitat, body size, range size, and generation time of species within montane forests, we aim to determine traits correlating with risk of extinction, which could be used to predict species at risk in the future, and aid in classifying threats to data deficient species. Here, we will categorize species according to IUCN threat classifications and compare species traits between each threat level. When combined with information on threats to species, the results of this study will identify traits that may indicate increased susceptibility to extinction, informing extinction risk assessments and improving predictions for global change impacts on biodiversity and ecosystem functions.

ANALYSIS OF BIOGENIC SILICON IN PANICUM VIRGATUM

Addy Pletcher
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 133
Mentor(s): Stephen Hamilton (KELLOGG BIOLOGICAL STATION)

Although silicon (Si) is commonly thought of as an abundant resource in soil, uptake from crops may decrease Si concentration over years of harvest. This loss of Si would be detrimental for several reasons: plants rich in Si tend to be more resilient, boasting stronger stalks and higher biomass yield, while plants that lack this basic nutrient are more vulnerable to disease and predation. We are specifically interested in switchgrass (Panicum virgatum) due to its high potential for bioenergy fuels in the future. This exploratory analysis of switchgrass seeks to identify whether levels of Si are changing over time, and/or over a nitrogen fertilization gradient. Harvested biomass samples were taken from the first year of full crop establishment (2011) and the most recent harvest (2018) from the following plots: five Great Lakes Bioenergy Research Center Biofuel Cropping System Experiment (GLBRC BCSE) reps, and the lowest and highest nitrogen treatments of the Switchgrass Resource Gradient Experiment. Said samples were dried, weighed, extracted, and analyzed for Si in triplicate. Although no significant change in Si content over time was found, it was observed that plants treated with high nitrogen yielded lower Si content, while the opposite was true for plots without added N.

THE EFFECTS OF PFAS IN EXTRAVILLOUS TROPHOBLAST INVASION

Madison White
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 134
Mentor(s): Almudena Veiga-Lopez (ANIMAL SCIENCE), Yong Pu (ANIMAL SCIENCE)

Poly- and perfluoroalkyl substances (PFAS) are synthetic and persistent chemicals used in many commercial products such as: fire-fighting foam, food containers, pots/pans, and apparel. PFAS are endocrine disrupting chemicals (EDCs) which can interfere with the body's metabolic and developmental pathways. PFAS chemicals have long half-lives and tend to bioaccumulate. Humans are commonly exposed, as demonstrated by several studies where PFAS is present in serum in up to 98% of the population. During early pregnancy, extravillous trophoblast cells from the placenta invade into the uterine lining, and then spiral arteries form so that maternal blood can nourish the developing fetus. Failure of trophoblast invasion and spiral artery formation occurs in preeclampsia, a common pregnancy disorder. PFAS exposure has been positively associated with preeclampsia. However, whether PFAS exposure leads to defects in trophoblast invasion, increasing the susceptibility to develop preeclampsia or other pregnancy complications, remains unknown. Therefore, my study aims to investigate PFAS's effects on extravillous trophoblast invasion. I will be using the HTR8/SVneo cell line, which are first trimester human trophoblast cells, then studying their response to PFAS in the context of cell cytotoxicity, cell proliferation, cell invasion, and gene expression key during trophoblast invasion. Results from this study will help determine doses at which PFAS may be able to interfere with extravillous trophoblast cell invasion.

INSECT HERBIVORY AS A DRIVER OF LOCAL PRAIRIE PLANT EXTINCTION

Brendan Canavan
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 135
Mentor(s): Marjorie Weber (PLANT BIOLOGY)

Michigan has lost 99% of its historical prairies. This habitat loss has caused a decline in plant diversity—in Kalamazoo County alone, 12% of prairie species were lost between 1890-2004.However, other factors such as agricultural development (leading to increasing nitrogen levels in nearby prairie habitats) and rising temperatures likely influence species declines. Nitrogen and rising temperatures are also predicted to increase insect herbivory on plants, which may then impact plants' population dynamics. We examined if insect herbivory differs between two experiments manipulating anthropogenic change: a gradient of nitrogen addition and an experiment manipulating temperature(ambient and warmed, +3°C).We then asked if insect herbivory influenced local plant extinctions by examining insect damage on five confamiliar pairs of locally extinct and present prairie species once found in Kalamazoo County, MI. We also examined insect preferences for certain species or if the hairiness of a plant affects the amount of herbivory damage received. In the nitrogen gradient, herbivory increased with higher nitrogen levels, and present species were more likely to be eaten by insects. We detected no differences in insect damage between warmed and ambient plots, and species' hairiness does not correlate with damage. These results demonstrate that herbivory may not have influenced these plant extinctions, but patterns of insect herbivory may shift with human land use impacts such as nitrogen addition.

EXAMINING CONNECTIONS BETWEEN AGRICULTURE AND FECAL CONTAMINATION IN MICHIGAN

Parker Renberg
Environmental Science and Natural Resources, Poster Presentation

Section: 1, 9:00 - 10:30 AM
Presentation Number: 136
Mentor(s): Sherry Martin (EARTH AND ENVIRONMENTAL SCIENCES)

Human agricultural practices have large impacts on water quality, especially due to runoff around large scale farms. Raising crops and accompanying fertilization introduce large amounts of nutrients to nearby waterways. Similarly, waste from animal agriculture (cows and pigs) has comparable effects, along with potential spread of disease. This research will analyze water samples from multiple watersheds to understand the impacts of agricultural activity (including animal agriculture) and potentially associated water contamination. The selected watersheds were chosen based on results from a previous study showing differing levels of nitrogen and phosphorus in comparison to other nearby areas. The samples were taken from multiple sites within each watershed under different hydrologic conditions. This analysis will utilize microbial source tracking (MST) markers to understand how agricultural practices affect fecal contamination in surface waters. MST specifically is useful as it aids in identifying sources of pollution that are otherwise hard to trace and measure. Current analyses are focused on the relationships between fecal contamination from different sources (humans, cows, pigs), water chemistry, and types of land cover. There will be a specific focus on temporal trends in farming practices, as said practices and associated contamination may be highly dependent on season.

PARTICIPATORY RISK MAPPING OF PLOUGHSHARE TORTOISE TRAFFICKING IN MADAGASCAR: IMPLICATIONS FOR COMMUNITY-BASED CONSERVATION

Hannah Eberhard
Environmental Science and Natural Resources, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 146
Mentor(s): Meredith Gore (FISHERIES & WILDLIFE)

The ploughshare tortoise (Astrochelys yniphora) is the most endangered tortoise species in the world—found only in Baie de Baly National Park of Madagascar. These tortoises are being trafficked to Europe and Asia for the illegal pet trade; the illegal trade is severely undermining community-based efforts to conserve the species. Conservationists and law enforcement authorities remain unclear about the nature, scope, and scale of the illicit supply chain (Mandimbihasina et al., 2018). The goal of this study was to leverage local knowledge about tortoise trafficking with a focus in informing more effective conservation activities. The first objective of this study was to identify where illegal activities involving ploughshare tortoises is occurring within the National Park. The second objective was to determine what characteristics of these highly active areas make them more susceptible to illegal activities. We used participatory risk mapping (PRM) with approximately 50 participants in Madagascar, December 2018 to achieve objectives. We digitized and analyzed maps using ArcGIS and found that sightings of ploughshare tortoises significantly overlap spatially with the populated areas, locations of conservation organizations and police forces. The trafficking routes of the ploughshares indicate great correlation with enforcement agency areas, which could be due to a variety of reasons. Community-based conservation efforts that focus on increasing willingness, capacity, and ability of community members to focus on informal guardianship may help prevent the conservation crime from occurring in the first place and help conserve the remaining tortoises.

ANALYZING SEPTIC POLICY AND PROPERTY VALUES IN MICHIGAN

Max Offerman
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 299

Mentor(s): Robert Richardson (COMMUNITY SUSTAINABILITY)

Michigan is the only state in the nation without uniform standards for how on-site septic systems are maintained. Certain counties have adopted time-of-sale inspection policies, but a majority have not. We attempted to better understand the impact of these policies on the value of residential properties in affected counties. Our research included a statistical analysis of the impact of water quality on the value of residential properties in the Lower Peninsula and a triple differences (TD) model to test for the effect of the time-of-sale policies on the value of affected houses in counties where such policies have been adopted. The results showed no significant effect on the value of houses after septic inspection policies were enacted. Our research also showed a positive association between property value and water clarity in nearby lakes. We recommend periodic septic inspections, rather than time-of-sale inspections.

MACROINVERTEBRATE COMMUNITIES ASSOCIATED WITH WEAKLY ELECTRIC FISH OF GABON, WEST-CENTRAL AFRICA

Emilie Parkanzky
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 300
Mentor(s): Courtney Larson (ENTOMOLOGY)

Under an ecological speciation scenario, the radiation of African weakly electric fish (Mormyridae) of the genus Paramorymrops is driven by an adaptation to different food sources, associated with diversification of their electric signals, which they generate and use for foraging, navigation, and communication. This study aimed to collect evidence for a phenotype – prey correlation to test this scenario. To do so, we focused on a molecular stomach content analysis of weakly electric fish communities in five rivers of Gabon. To characterize the pool of macroinvertebrate prey diversity and abundance we also sampled the macroinvertebrate communities and performed both traditional morphological and molecular-based macroinvertebrate species identification methods. As the freshwater ecosystems of Gabon are understudied, macroinvertebrate community surveys can also have multiple future applications, including improved biomonitoring data and accuracy of ecosystem health conclusions. This is especially true since freshwater ecosystems are under multiple stressors, and it is therefore important to take stock of native biodiversity in understudied regions of the world. In this presentation, I will discuss the results of the morphologically-based identification of benthic macroinvertebrate communities. In the future, these results will be compared to molecular-based macroinvertebrate identification methods to assess the performance of DNA-based stream community monitoring. Gut content analyses of weakly electric fish will then be analyzed in the context of these local prey communities to understand the extent of inter- and intraspecific dietary partitioning. This study represents one of the first field-based ecological study of African weakly electric fish and their associated macroinvertebrate prey communities.

USING MICROSATELLITE LOCI FINGERPRINTING AS A MARK RECAPTURE TECHNIQUE TO PROVIDE A POPULATION ESTIMATE OF BLACK BEAR IN NEVADA

Ashley Kimmel
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 301
Mentor(s): Robert Montgomery (FISHERIES & WILDLIFE)

Black bears (Ursus Americanus) have been moving back into western Nevada from California over the last twenty years. In recent years, little research has been done to provide an accurate population estimate for this changing population. Non-invasive hair snaring has been

used for determining black bear populations historically, but very few methods have been published to genetically identify individual bears. This data will inform wildlife managers of population parameters and can be used to make management plans and decisions. The goal of this project is to provide individual identification of black bears, from hair samples, to be used in a current population estimation and in doing so, optimize a genetics-based protocol using molecular biology techniques. Over the summers of 2018 and 2019, 207 and 155 hair samples, respectively, were collected from 100 snares across field sites in western Nevada. Existing genetic methods of population estimation were refined for the purpose of this project. Using light microscopy, silica-based DNA extraction, polymerase chain reaction (PCR), and gel electrophoresis; microsatellite sequences were identified and used to determine individuals. Microsatellites are short tandem repeats in a genome that 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. Future work will include continued validation of the new, optimized method by testing hair samples collected in the summer of 2020.

ESTIMATION OF SEPTIC NUTRIENT INPUT ACROSS THE CANADIAN GREAT LAKES BASIN

Kyle Cole

Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 302
Mentor(s): Anthony Kendall (EARTH AND ENVIRONMENTAL SCIENCES), Quercus Hamlin (EARTH AND ENVIRONMENTAL SCIENCES)

While nitrogen and phosphorus are essential nutrients for life, anthropogenic inputs can create excessive loads to aquatic ecosystems. These excessive loads can fuel algal blooms and hypoxia, which can wreak havoc on these ecosystems, impact human health, and cause economic toil. Some nutrient inputs are delivered through easily measured and identified point sources; however, the vast majority of inputs are difficult-to-measure nonpoint sources distributed across the landscape in individually small, but collectively large, loads. By identifying these nonpoint sources, we can provide data that will allow watersheds to be more effectively managed. In areas without access to wastewater treatment plants (WWTPs), septic tanks, which release nutrients directly into the surrounding soil and groundwater, are the main sewage treatment system. Here, we present methods for quantifying septic systems, one of six major nonpoint nutrient inputs, in the Canadian Great Lakes Basin as part of a nutrient input mapping project, the Spatially Explicit Nutrient Source Estimate Map (SENSEmap). Data on the location and nutrient inputs of septic tanks is unrecorded on the provincial scale, so we used location and effluent flow data for WWTPs, population data from the Canadian census, and maps of roads and bodies of water to estimate the locations and inputs of septic tanks. Using data on national rates of septic tank use and WWTP boundaries we were able to validate the accuracy of these estimates.

MSU LABORATORY WASTE AND THE FUTURE OF SUSTAINABLE STEM PRACTICES

Jake Namovich

Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 303
Mentor(s): Isaac Record (LYMAN BRIGGS COLLEGE)

For the past year, I have explored the inconspicuous phenomenon of laboratory waste. As a student of the natural sciences, I found myself drawn to learn about sustainability, but I noticed that I was not always embodying these teachings in my laboratory practices. It is time to begin questioning our relationships with the materials we use to create knowledge. The

goals of this project were to 1) model the MSU laboratory waste system; 2) understand behaviors, technologies, and practices that contribute to the generation of laboratory waste; and 3) design productive and effective strategies for change. Not only has this project brought about new knowledge of laboratory waste generally, but also new questions that we must address. Through reflection, we might rethink how we teach, how we organize our laboratory spaces, how we design our experiments, and even how we impact other communities through this waste stream. The study was made possible by networking and dialoguing with laboratory teams, laboratory managers, procurement officers, MSU EHS, MSU IPF, and MSU Sustainability. By communicating with these community members and immersing myself in various on-campus laboratories, I was able to create a model that is sensitive to the intricacies of our laboratory waste management system. Furthermore, these opportunities have given me insight into the structures and characteristics of these laboratory spaces. Finally, I have helped foster new considerations and awarenesses in the MSU STEM community through the promotion of interventions and metrics that have the potential to enact meaningful change.

MEASURING SOIL PHYSICAL, GEOCHEMICAL, AND ELECTRICAL PROPERTIES TO HELP REVEAL THE HIDDEN WORLD OF ROOTS.

Amanda Liddle
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 304
Mentor(s): Anthony Kendall (EARTH AND ENVIRONMENTAL SCIENCES)

Landscapes are changing across the globe in response to growing populations, shifting agricultural practices, and changing climate. Plants, the dominant users of water on these landscapes, are responding dynamically in turn, with changing: plant species composition, development cycles, and root architectures. The hidden nature of roots obstructs our efforts to understand how the hydrologic cycle is altered by plant root water uptake. Traditional methods to measure roots are either destructive or costly (or both). Measuring the electrical resistivity of the ground is one method that has shown promise to effectively image plant roots. In addition to roots within the subsurface, the chemistry of soil water as well as soil clay and mineral content can obscure the potential signal of roots. To examine the physical, geochemical, and electrical properties of the subsurface, 3.6m deep cores were taken from two different environments in SW Michigan: deciduous forest and grassland with some shrubs—where seasonal variation in electrical resistivity of the soil profile has been measured in situ. Results, so far, show a strong inverse relationship between soil moisture and bulk resistivity controlled by the transition from fine to coarse grains at around 1 m depth. Agreement in resistivity and grain size patterns between the two cores suggests that these features remain consistent at the site-scale. With enough information, the effects of soil properties and chemistry can be both understood and simulated across landscapes, which allow for the presence and distribution of roots to be revealed.

TEMPORAL VARIATION IN COMMUNITY INTERACTIONS ACROSS THE GROWING SEASON OF TALL GOLDENROD (SOLIDAGO ALTISSIMA)

Kelsey Doud
Environmental Science and Natural Resources, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 305
Mentor(s): Dan Turner (ENTOMOLOGY), William Wetzel (ENTOMOLOGY)

Genetic and environmental variation are two sources of heterogeneity influencing ecological interactions. Genetic variation can influence how individuals within species variably respond to abiotic and biotic environmental factors that change throughout the growing season.

However, most studies about the effects of intraspecific diversity on community dynamics have investigated interactions at a single time point or as they aggregate across the growing season. Using the tall goldenrod (Solidago altissima) model system to study plant-herbivore interactions, we observe how the effects of genetic diversity and early-season herbivory from a specialist plant bug, Slaterocoris sp., scale up to influence community dynamics across the plant's growing season. We compared chewing damage, plant pathogen prevalence, and arthropod abundance between treatment and control plants across sixteen genotypes of S. altissima in a common garden experiment. We found that early-season herbivory and genotype explained differences in herbivory and pathogen damage throughout the growing season and that genotypes displayed unique trajectories in community interactions. These results highlight the importance of observing the interactions between genetic diversity and early-season herbivory at multiple time points to understand temporal variation of plant-herbivore community ecology.

BOMBARDED BY BUGS: THE USE OF BIOBLITZES TO ASSESS ARTHROPOD DIVERSITY AT COREY MARSH ECOLOGICAL RESEARCH CENTER

Brenna Jeffs
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 485
Mentor(s): Amanda Lorenz (ENTOMOLOGY)

A BioBlitz is a citizen science initiative to survey the organisms of a specific area in a short (1-2 day) timeframe. Corey Marsh Ecological Research Center (CMERC) is a newly-established MSU field research site in Laingsburg, MI, dedicated to ecological restoration. In May and September of 2019, BioBlitzes were held at CMERC to assess the biological diversity of the site prior to restoration, including arthropod biodiversity. Arthropod specimens were collected from a variety of habitat types including forest, prairie, and wetland habitats, and identified to the Order or Family level. Here we report on the communities of arthropods collected during both BioBlitzes in order to represent a snapshot of current arthropod diversity at CMERC. Data from this study will contribute to a long-term record of arthropod diversity as the site proceeds through ecological restoration in the coming years.

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
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 486
Mentor(s): Cheryl Murphy (FISHERIES & WILDLIFE), Tyler Firkus (FISHERIES & WILDLIFE)

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 of 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.

INVESTIGATING MICROBIAL LIFE 11,000 FEET INTO THE LITHOSPHERE

Vivian Werth

Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 487
Mentor(s): Matthew Schrenk (EARTH AND ENVIRONMENTAL SCIENCES)

Through this project we have a unique opportunity to investigate microbial interactions with reduced gas fluxes from the deep continental lithosphere from a hole drilled 11,000 feet into the subsurface for the purposes of natural gas exploration. Subsurface microorganisms may either attenuate, transform, or contribute to the flux of reduced gases, such as methane and hydrogen. Samples from this project provide a glimpse into the extent and nature of the subsurface biosphere, of which there are limited samples of sufficient quality to conduct microbiological analyses. More broadly, these studies are important to understanding the processes influence reduced gas flux from continental interiors and whether it is an economically viable sustainable fuel source. We are investigating if there are any microbial communities in the deep rock through examination of drill cuttings, if there are correlations between microbial biomass and geochemical/geophysical parameters, and if the microbial populations are likely to metabolize reduced gas. Through these studies, we will develop a better understanding about the effects that subsurface microbes have on this potential fuel resource and the extent of the deep biosphere.

ANALYSIS OF UPLAND SANDPIPER BREEDING HABITAT MANAGEMENT

Evan Griffis

Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 488
Mentor(s): Henry Campa (FISHERIES & WILDLIFE)

Upland Sandpiper (Bartramia longicauda) are a species of conservation concern in the United States. While native to the Great Plains and Midwest regions, exploitation by market hunters and land clearing for agriculture in the late 1800s and early 1900s removed Upland Sandpiper from much of the landscape. Through management and programs such as the Conservation Reserve Program (CRP), continental numbers are now on the rise, though particular regions are experiencing stabilize local losses in numbers and habitat. I reviewed scientific literature - master's theses, peer-reviewed journal articles, historic first-hand accounts, and current management plans - to evaluate the success of Upland Sandpiper management practices and provide management recommendations. Upland Sandpiper use fields greater than 30 hectares with flat topography for nesting, in areas which exhibit minimal occurrence of transitional edge habitat. Nest sites in all studies occurred in predominantly grassy areas. Vegetation height is an important factor in nest site selection with all nests in grass between 15 cm and 60 cm tall and 62% of nests between 15.5 and 30.8 cm. Managing for Upland Sandpiper should involve burning in mid-April to early May on a three-year cycle while leaving grasslands otherwise undisturbed through the breeding season of May through June. Grassland is most productive for Upland Sandpiper when bordering grazed and agriculturally disturbed grassland, used for brood raising and feeding. These management actions should occur through the Great Plains region, and locally within peripheral breeding range in the Eastern United States.

MONOTYPIC STANDS OF INVASIVE PLANTS IMPACT ON THE HEALTH OF GRASSLAND BIRDS

Hannah Landwerlen
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 489
Mentor(s): Jennifer Owen (FISHERIES & WILDLIFE)

Wetland and prairie ecosystems are important habitats for many species of birds. However, human-led land conversion for agriculture has allowed the invasion of non-native plants that over time have out-competed native species and have formed monospecific (or monotypic) stands. Populations of grassland birds in North America have experienced some of the greatest declines due to loss of habitat. Two species of birds, Eastern Bluebirds (Sialia sialis), and Tree Swallows (Tachycienta bicolor) use prairie and grassland ecosystems exclusively to breed, and forage for invertebrates. Insect diversity has been shown to decrease when plant communities become less diverse, which may have an impact on avian health. We will initiate a long-term study to assess the health of Eastern Bluebirds and Tree Swallows in relation to ongoing habitat restoration efforts (i.e. removal of invasive species and reestablishment of native species) and the subsequent changes to the arthropod community. Results from this study will lend insight into how invasive plants can lead to cascading effects across trophic levels and how restoration efforts can lessen the negative impact on avian health. The results of this long-term study will help inform land managers about best practices for the protection and conservation of grassland birds.

LIGNIN-BASED CLOSED CELL RIGID FOAM RESEARCH

Brett Cesar
Environmental Science and Natural Resources, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 490
Mentor(s): Christian Henry (FORESTRY), Mojgan Nejad (FORESTRY), Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Low density, closed-cell polyurethane foam is an extremely common insulation product because of its unique properties that include preventing heat transfer and being water-resistant. Currently, researchers are working on incorporating lignin, a plant-based polymer produced as a byproduct of the pulp and paper industry. Lignin can replace petroleum-based polyol in foam formulations to create a more sustainable and environmentally friendly product, with superior fire performance. This project will compare six samples of low-density foams ranging from 0-100% lignin in 20% increments. Using scanning electron microscopy (SEM), to help us to compare the effect of lignin incorporation on the microstructure of foams. These imaging results along with other measured foam properties will help us to evaluate the possibility of developing lignin-based foams. These fire-resistant foams will hopefully replace conventional building insulation materials and save many lives, by giving people more time to escape during building fires.

THE EFFICIENCY OF MOTH TRAP CATCH RATES BASED ON PRICE AND SIZE

Fadumo Ali
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 671
Mentor(s): Peter White (LYMAN BRIGGS COLLEGE)

The research I am conducting involves simple moth traps that can be built by students of all ages in an education setting. I am going to test the efficacy of these cheaper, simpler traps to

the larger, more expensive ones we use in our lab. We are researching these in the hopes of developing a model that educators can use in classrooms to build a better understanding and comfort for with moths, and insects in general, for students.

DEVELOPING A CONCEPTUAL MODEL OF PROCESSES CONTROLLING CARBON AND NUTRIENT EXPORTS IN AN ARCTIC PERMAFROST-DOMINATED LAKE

Sam Cairns
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 672
Mentor(s): Arial Shogren (EARTH AND ENVIRONMENTAL SCIENCES), Emma Haines (EARTH AND ENVIRONMENTAL SCIENCES), Jay Zarnetske (EARTH AND ENVIRONMENTAL SCIENCES)

The Arctic is warming at twice the rate of the rest of the planet, releasing terrestrially-stored carbon and nutrients that were previously frozen in permafrost soils. As a result of a rapid and accelerating climate change, there is strong evidence for the enhanced delivery of nutrients and carbon from land to water: increasing fluxes of biogeochemical solutes have been documented in most Arctic rivers. What remains an open knowledge gap is how Arctic lakes nested within river networks may modulate downstream biogeochemical fluxes. We performed a literature synthesis of 18 scientific articles to begin to conceptualize how Arctic stream-lake interactions contribute to biogeochemical behavior. We focused our synthesis to articles about interacting stream and lake processes. From these studies, we compiled several major abiotic and biotic processes that drive carbon (C) and nitrogen (N) species production and removal. The dominant processes controlling N likely include production of organic N and biotic uptake of inorganic N. For C, these include internal C fixation, and microbial and photochemical C degradation. While frozen permafrost represents a physical constraint in Arctic biogeochemistry and hydrology, ecological conditions in stream-lake connections likely modulate N and C fluxes throughout the summer season. In Arctic landscapes, interpreting interactions among factors that control material fate from land to water represents a unique challenge for the scientific community. As we continue data collection and interpretation of biogeochemical fluxes into and out of permafrost-underlain lakes, we can gain a better understanding of how stream-lake interactions modulate Arctic ecosystem budgets.

PROBING LATE-STAGE MAGMATIC PROCESSES WITHIN A FAILED CONTINENTAL RIFT - CONSTRAINTS FROM MICHIPICOTEN ISLAND

Trevor Baranski
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 673
Mentor(s): Alex Steiner (EARTH AND ENVIRONMENTAL SCIENCES), Chris Svoboda (EARTH AND ENVIRONMENTAL SCIENCES), Tyrone Rooney (EARTH AND ENVIRONMENTAL SCIENCES)

The process by which continents rupture to form ocean basins is termed continental rifting. Lavas erupted within continental rifts represent an opportunity to probe how the process of rifting occurs. Modern rifts are useful in exploring the magmatic processes that form lavas during the the early- to middle-phases of rifting, but do not provide an effective record of the terminal stages as the accumulation of ocean sediment obscures it. An alternative approach is to examine failed rifts where the terminal phase of rifting remains preserved at the surface. The Mid-Continent Rift (North America) is a failed rift where late stage lava flows are exposed on Michipicoten Island. Previous research by our group focused on the earlier flows on the island and found multiple crystal populations, suggestive of a multi-stage magmatic

differentiation system. We explore later flows in the volcanic pile: Quebec Harbor and Channel Lake. Samples taken from these flows show that these lavas are compositionally andesites, an unusual observation in rifts and suggestive of a very complex magmatic system. We imaged and analyzed clinopyroxene and plagioclase phenocrysts from Quebec Harbor and Channel Lake using SEM and ICP-MS micro-analysis. We firstly explore whether the crystals within the andesites are in equilibrium with the melt, or were introduced by a secondary melt(s). We further examine the magmatic plumbing system by modelling the temperature and pressure conditions on the basis of the composition of these crystals. Using these data we examine the magmatic plumbing system that formed these unusual rift andesites.

ADDITION OF NANOCELLULOSE IN FLEXIBLE, POLYURETHANE FOAM

Madeline Robison

Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 674
Mentor(s): Ramani Narayan (CHEMICAL ENGINEERING AND MATERIALS SCIENCE)

Cellulose nanocrystals (CNC) introduce an environmentally friendly way to improve the properties of flexible, polyurethane foam in automotive applications. Cellulose, derived from plants, is being used in many different applications as its abilities to improve the properties of various materials. Furthermore, cellulose is not just good for its amazing properties, but also it is a sustainable and renewable resource. By using cellulose as a filler in polyurethane foam, we are introducing an environmentally friendly way to improve the properties of this important material. Foam is a unique and important material because if its versatile abilities. It can withstand a wide range of temperatures, needed for automotive applications because of the varying weather patterns around the world. It is a lightweight material that has impressive compression abilities. This is important for automotive applications because it provides better fuel economy and is able to retain its shape. Compression, wet compression and density testing were improved. Tensile and tear did not improve, however compression and NVH values are most important for under hood applications of foam. Future tests will be done to ensure better CNC dispersion throughout the foam and to improve tensile and tear testing.

SOIL HEATING DUE TO FIRE INCREASES SOIL CARBON-DIOXIDE EMISSIONS AND DECREASES MICROBIAL CARBON STORAGE DURING POST-FIRE RECOVERY

Megan Orlando

Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 675
Mentor(s): Jaron Adkins (FORESTRY), Jessica Miesel (PLANT, SOIL, AND MICROBIAL SCIENCES)

Climate change has led to an increase in wildfire activity in ecosystems globally, a trend that is expected to continue. Soils store a large reservoir of carbon, and the processing of soil carbon by microbes determines whether carbon remains in the soil or is emitted as CO2. Thus, the effects of fire on soil microbial communities are important because changes to carbon respiration and biomass storage will impact fire-climate feedbacks. Our objective was to quantify the amount of carbon respired versus stored in microbial biomass in response to simulated fire effects. We collected soils from a mixed-conifer forest in the Sierra Nevada mountain range of California, USA. We heated soils in a furnace at 100° C or 200° C for 45 minutes. We added burned and unburned pine or oak litter to the heated soils and unheated controls and incubated for two weeks. We measured soil microbial biomass growth and carbon respiration throughout the incubation period. Soil heating led to temporary increases in CO2 respiration. The effects of soil heating on microbial biomass were dependent on

heating intensity. Soils heated to 100°C exhibited greater microbial biomass growth when compared to unheated soils, while soils heated to 200°C showed microbial biomass loss. Our results show that intense soil heating causes a decrease in carbon stored as biomass and an increase in carbon emitted as CO2, over the short term. These results are important because they indicate that increased wildfire activity may lead to elevated soil carbon emissions into the atmosphere post-fire.

POLITICAL AND CULTURAL INFLUENCES ON SUSTAINABLE DEVELOPMENT IN THE UNITED STATES AND EUROPE

Theodore Borowicz
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 676
Mentor(s): Pia Banzhaf (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

With the continuing advancement of technologies used in sustainable infrastructure, one might wonder why the adoption of this infrastructure occurs much faster in European countries like Germany in comparison to the United States. After all, The U.S. has the most powerful economy on the planet, was a global leader of environmental sustainability in the 1970s, and could easily lead the world in sustainable technology and environmental conservation efforts today. Since the answer does not always seem to lie within the technical capability to achieve such goals, but rather in the political and cultural environments in which these developments occur, I analyzed the forces behind the expedited adoption of green technology and environmentally sustainable communities in Germany. From a comparison of U.S. statistics with a focus on Michigan with Germany, concrete reasons emerge why we often do not pursue sustainable projects with the same intensity as many Europeans.

OIL SPILLS UNDER ICE: KINETICS OF OIL SPREADING AS A FUNCTION OF ICE COVER CHARACTERISTICS

Vincent Marinelli
Environmental Science and Natural Resources, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 677
Mentor(s): Volodymyr Tarabara (CIVIL & ENVIRONMENTAL ENGINEERING)

Installed in 1953, Enbridge's oil pipeline "Line 5" transports 540,000 barrels per day of light crude oil and natural gas liquids beneath the Straits of Mackinac. American portions of Line 5 start in Superior, Wisconsin and across Michigan's Upper Peninsula, then across the lakebed in the Straits of Mackinac before terminating in Sarnia, Ontario. Recent events have raised concerns about Line 5's safety and potential for spill potential in ice-covered conditions. An ice cover may restrict the spread of oil by shielding the released crude from wind transport and partly immobilizing the spill. Absent turbulent conditions (<0.2 m/s), crude constituents should rise to the ice-water interface and pool at the ice's underside, with laboratory and field observations indicating that oil will coalesce, form a slick, and spread while resting on the ice-water interface. As a result, the morphology of the ice-water interface is of critical importance to the potential spread of oil. The working hypothesis is that the morphology of the oil plume follows the fractal scaling law and can be predicted based on the fractal dimension. Current work focuses on establishing a relationship between the structure of the ice-water interface, oil properties and morphology of the plume. The ultimate goal of the project is to develop a set of recommendations for under-ice oil spill remediation policy and best practices.

IMPROVEMENT ON THE DEVELOPMENT OF ACTIVE PACKAGING TRAYS WITH ETHYLENE REMOVING CAPACITY

Viet Phan
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 9:00 AM
Presentation Number: 833
Mentor(s): Eva Almenar Rosaleny (PACKAGING)

Spoilage is a major issue that consistently presents a problem to the food packaging industry. The presence of ethylene is a major contributing factor, and a valid solution to this problem is the use of active packaging. Active packaging can reduce the amount of ethylene in the packaging container by using ethylene scavengers such as active carbon. Research on the use of activated carbon as an ethylene scavenger has already been validated, however the focus of this research is to chemically treat the active carbon to observe the effects of these treatments on its ethylene scavenging capability. The treated and non-treated active carbon was incorporated with a plastic resin and processed into packaging trays in order to compare the ethylene scavenging capacity of the trays. The effect of treating activated carbon on the ethylene scavenging capacity of the trays will be presented.

GREAT LAKES ECHO RESEARCH PRESENTATION

Cassidy Hough, Connor Smithee, Kaylie Connors
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 9:15 AM
Presentation Number: 834
Mentor(s): David Poulson (JOURNALISM)

Environmental journalism is important because of how it educates people about the ongoings of the environment and scientific discoveries. We are reporters for Great Lakes Echo. In the past months we have been working, we have engaged in researching environmental issues to report on. While writing stories, we have talked to many researchers, scientists and professors from around the Great Lakes region. In doing this, we have not only learned a great deal about the environment but journalism as well and how to put the two together. Environmental journalists play the role of leiozon between the science community and the media so we have been learning how to make it easily understood by readers. We have been working on how to efficiently bring the works of scientists and environmentalists to the public eye by doing in depth research, conducting interviews and reading studies.

MODELLING INTERACTIONS BETWEEN SHIPPING AND ARCTIC MARINE MAMMALS USING ABMS AND THE ROAD ECOLOGY FRAMEWORK

Kaylee McCarthy
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 9:30 AM
Presentation Number: 835
Mentor(s): Jianguo Liu (FISHERIES & WILDLIFE), Kelly Kapsar (BIOLOGICAL SCIENCE PROGRAM)

In recent years, the Arctic has experienced an increase in open water days and loss of sea ice, which may make Arctic Marine Mammals (AMMs) more vulnerable to anthropogenic threats, including ship strikes. The threat of human contact is exacerbated by the expansion of shipping enabled by diminishing sea ice. The remoteness of the Arctic and elusiveness of AMMs complicates data collection, making studies nearly impossible to replicate in a lab setting. Agent-based models (ABMs) are frequently used to simulate interactions between ships and whales. Recently, it has been suggested that the road ecology framework, which investigates relationships between road systems and surrounding ecosystems, can be applied to marine shipping by viewing shipping lanes as "roads." However, marine environments have

the added dimension of depth, which influences the likelihood of contact between organisms and ships. Depth and other bathymetric features affect AMMs by driving site fidelity and other behaviors, such as feeding in productive areas. While there have been studies in the road ecology framework that include height as a third dimension when analyzing birds and bats, there have not been studies that include depth and apply the road ecology framework to marine shipping. In this presentation I will share results from my literature review about Arctic environmental changes and emerging methods of modelling them. I will discuss the structure and preliminary results of our own ABM. Modelling interactions between ships and AMMs allows us to better understand the consequences of increased shipping and develop ways to mitigate human-wildlife conflict.

CHARACTERIZATION OF GREAT LAKES STREAM BACTERIAL COMMUNITIES ACROSS TIME AND LANDSCAPES

Gabrielle Sanfilippo
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 9:45 AM
Presentation Number: 836
Mentor(s): Kim Scribner (FISHERIES & WILDLIFE)

Aquatic microbial communities are sentinels of geological and hydrological landscape features and anthropogenic disturbances and perform essential ecosystem functions. Local populations of stream organisms, including fishes, are adapted to specific biotic stream components, including bacteria. Ecosystems are supported by bacteria through inter-relationships with plants and animals at all trophic levels. Therefore, bacterial diversity and composition can have consequences for species of management concern. Bacterial-vertebrate relationships are understudied. In this study, we characterize and compare the taxonomic composition and diversity of bacterial communities in 21 rivers of the upper Great Lakes watershed during April and June 2019. One liter of river water was filtered through 0.2-micron filters and bacterial genomic DNA was extracted from filtrate using antiseptic techniques. Using the highly variable V4 region of the 16s gene of rRNA, we performed bacterial metabarcoding. Greater than 90% of variation in relative abundance between rivers and time were attributed to 11 phyla across 10,800 OTUs rarefied to 1636 sequences per stream. Differences in community composition were significantly positively correlated with geographic distance, suggesting that landscape hydrology and patterns of local land use vary spatially. Further analyses of bacterial community diversity, composition, and associations with specific landscape features will be discussed. Analyses of diversity are expected to further explain factors contributing to significant differences in stream communities. Understanding association of bacterial communities and spatial landscape features and anthropogenic disturbance may better inform managers of ecosystem health and species composition in aquatic ecosystems of concern.

EFFECTS OF LLDPE CONTAINING ORANGE PEEL AGROWASTE ON THE SHELF LIFE OF BREAD

Peter Macke
Environmental Science and Natural Resources, Oral Presentation
Section: 5, 10:00 AM
Presentation Number: 837
Mentor(s): Eva Almenar Rosaleny (PACKAGING)

The research I conducted involves exploring the microbial growth, moisture blocking means, and texture preserving properties of a film that is in the development process. This film is a linear low-density polyethylene (LLDPE) composite containing agriwaste comprised of orange peels. The LLDPE orange peel composite has the ability to block moisture, preserve the texture, and prevent microbial growth as well or better than the neat LDPE that is

currently being used to preserve bread in stores today. This is significant because the fact that it can preserve food as well as the neat LLDPE, it means that manufacturers may be able to produce a product using less plastic, which would cost them less, as well as being more environmentally friendly. To test these factors, I have conducted a shelf life study using bread under the guidance of Dr. Eva Almenar and Jack Fehlberg.

ETHANOL PRESERVATION OF SPECIMENS CAN CONTRIBUTE TO BIAS IN MORPHOMETRICS ANALYSES

Bailey Lorencen
Environmental Science and Natural Resources, Oral Presentation
Section: 6, 3:30 PM
Presentation Number: 853
Mentor(s): Jared Homola (FISHERIES & WILDLIFE), John Robinson (FISHERIES & WILDLIFE), Kim Scribner (FISHERIES & WILDLIFE)

Geographic variation in morphological traits, when sampled from individuals collected in different environments, can be sensitive indicators of adaptation. Inferences of trait variability can be confounded when measurements are based on preserved samples. We evaluated effects of ethanol preservation for a Great Lakes invasive fish, round goby, using replicate measurements taken in a time series over 17 weeks. We also tested whether observed changes were consistent across lake and river habitat types. We hypothesized that decreases in body mass and length and changes in body shape would occur non-linearly through time, with most changes occurring soon after preservation. We used hook-and-line sampling to collect 30 round gobies from Lake Michigan at Muskegon and Cedar Creek, a nearby tributary. Each fish was photographed and weighed (0.01 g) to obtain pre-preservation measurements and preserved in 70% ethanol. Photographs and mass measurements were taken for every fish at 1- and 2-days post-preservation, then weekly thereafter. We used geometric morphometrics to analyze 17 lateral and six dorsal landmarks using TPSDig2 software. A generalized least square regression determined that length did not significantly vary through time for either population, while mass showed modest decreases. Body shape variation was summarized using principal component analysis, which revealed most change occurred in the first 14 days. Differences in shape were apparent between the two populations throughout the experiment with riverine fish appearing slenderer and having a more hydrodynamic head shape. Improved knowledge of preservation effects will improve our ability to implement unbiased morphometric studies in the future.

AN ENVIRONMENTAL JUSTICE STUDY ON LAKES AND HUMAN DEMOGRAPHICS

Jessica Diaz
Environmental Science and Natural Resources, Oral Presentation
Section: 6, 3:45 PM
Presentation Number: 854
Mentor(s): Ian McCullough (FISHERIES & WILDLIFE), Kendra Cheruvelil (LYMAN BRIGGS COLLEGE), Patricia Soranno (FISHERIES & WILDLIFE)

The quality of the environment a person lives in can have drastic impacts on the health and future of that person, and while everyone should be guaranteed a safe environment, this is not the case. Countless studies have shown that people of color and low-income people are disproportionately affected by environmental injustices, such as toxic waste facilities. However, few environmental justice studies focus on water quality. Water quality is important as humans use water ecosystems, such as freshwater lakes, for drinking, recreation, agriculture, and sustenance.The effects of living near lakes with poor water quality or not living near a lake to begin with could amplify the environmental and social injustices that low-income communities and communities of color already experience. This study investigates the spatial relationship between the water quality of lakes and the socio-demographic characteristics of their surrounding area in the Northeast United States. Socio-demographic

data from the 2010 U.S. Census and water quality data from LAGOS-US is used to answer the question: Are populations already socially marginalized, such as people of color and low-income people, more likely to live near lakes with poor water quality and within their watersheds? A framework has been developed to analyze the data using ArcGIS, a spatial mapping software, and Rstudio, a statistical computing program. This study is ongoing and preliminary results will be presented.

BROKEN CIRCLE
Noel Thomas
Environmental Science and Natural Resources, Oral Presentation
Section: 6, 4:00 PM
Presentation Number: 855
Mentor(s): Theresa Winge (ART, ART HISTORY, AND DESIGN)

When fast and cheap fashion is readily available, how is the average person supposed to understand that it is costing their nations' clean water? While this may seem extreme, the accelerating speed at which people are purchasing and disposing of apparel dictates our dystopian reality. Plastic pellets are the start of many of our everyday plastic products: hangers, tags and even the clothes we wear everyday, but at a cost. Plastics have been a long-term issue for a while, but especially within the fashion industry. The spike in fashion consumerism over the last decade results in significant environmental issues. How can we educate the consumer to understand the environmental consequences for purchasing a $10 sweater? Through the research of plastics and garment production from start to finish, I am analyzing the possibilities of a full circle or zero waste methodology for fashion design. In this presentation my goal is to bring awareness to the current environmental consequences occurring and the possibilities of full circle design in hopes of a solution being discovered.

ON THE BANKS OF THE RED CEDAR: DESIGNING A MORE RESILIENT FLOOD PLAIN
Amanda Wakefield, Angela Yuan
Environmental Science and Natural Resources, Oral Presentation
Section: 6, 4:00 PM
Presentation Number: 855
Mentor(s): Jun Hyun Kim (SCHOOL OF PLANNING, DESIGN & CONSTRUCTION), Ruth Kline-Robach (COMMUNITY SUSTAINABILITY)

Michigan State University (MSU) faces several challenges with the river that affect the surrounding campus, one of which is flooding during the rainy season. Changing precipitation patterns have led to increased flooding and the threat of extensive damage to campus infrastructure. The University has spent hundreds of thousands of dollars addressing this damage in recent years. This study aimed to mitigate flooding impacts using systematically designed stormwater management practices as well as promote social interaction and emotional wellbeing. Our study area was 117-acres of MSU's Red Cedar River floodplain, comprised of 19 buildings, parking lots and a total of 40 acres of impervious area. Our design removed impervious surfaces and an existing weir, while adding bioswales, green roofs, bank stabilization and recreational amenities. As a result, the design decreased the impervious area by 70%, increased infiltration by 159% and increased evaporation by 136% (EPA National Stormwater Calculator). In addition to these performance metrics, the study site will manage 2.46 inches of rain an hour. If our design had been in place in 2018 when the campus experienced a 100-year flood event, it could have controlled 94% of the stormwater runoff. The goal of the overall study is to address the environmental, social and economic hurdles that arise from extreme weather events, while proactively creating a river environment that can be enjoyed by the entire MSU community.

EPIDEMIOLOGY & PUBLIC HEALTH

BRINGING IT TO ZERO: ALCOHOL & OTHER DRUGS IN HISPANIC SUBGROUPS OF THE U.S.

Adnan Barazi
Epidemiology and Public Health, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 583
Mentor(s): James (Jim) Anthony (EPIDEMIOLOGY AND BIOSTATISTICS), Madhur Chandra (EDUCATION POLICY CENTER)

Most research on alcohol and other drug use disorders (AODD) takes an undifferentiated panoramic view of all Hispanic persons in the United States (US). We aim to model how AODD occurrence might change by eradicating specific drug subtypes with focus on US Hispanic subgroups. The study population was sampled, recruited, and assessed with computerized self-interviews for the National Surveys on Drug Use and Health, 2002-2013 (n >= 100,000 Hispanic participants in public use datasets; participation level >65%). Analysis-weighted prevalence proportions and case counts were estimated for AOD Disorders across self-identified ethnicity subgroups. Variances are from Taylor series linearization. All subgroups would benefit by eradicating alcohol disorders. The Puerto Rican and Central/South American subgroups would benefit most by the eradication of cannabis. By eliminating cocaine, the Cuban subgroup would see the greatest proportional decline in AODD counts. Puerto Rican AODD counts would be reduced by 23,000 (95% CI: = -1,000, 47,000) through the elimination of heroin. By imagining counterfactual worlds, we can forecast relative benefits of public health approaches that seek to prevent and reduce AODD occurrence. Heterogeneity of public health service needs can be seen only by replacing the typical panoramic view of 'Hispanic health' with a nuanced differentiation of the multiple Hispanic subgroups.

MAJOR DEPRESSION IN ADOLESCENCE: FOCUS ON PREVESCALATION

Madison Walsh
Epidemiology and Public Health, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 584
Mentor(s): James (Jim) Anthony (EPIDEMIOLOGY AND BIOSTATISTICS), Paul Quinlan (COUNSELING AND PSYCHIATRIC SERVICES), Villisha Gregoire (ENGINEERING)

'Prevescalation' refers to preventing escalation of toxic exposure frequencies or pathological processes, typically via clinical or public health interventions launched early enough to prevent diseases or syndromes such as Major Depression (MD). Seeing recently increased numbers of adolescent MD cases in epidemiological statistics for the United States (US), we are studying state-transitions that pre-date onset of MD syndromes. We now estimate age- and time-specific attack rate (AR) for MD syndromes once a brief depression spell (BDS) has occurred (i.e., how often a BDS state escalates to an MD state). Each year, 2004-2018, US study populations included non-institutionalized 12-to-17-year-old civilian community residents sampled, recruited, and assessed via computer-assisted-self-interviews for National Surveys on Drug Use and Health (participation levels >65%). From public use datasets (n>2000 at each age), we derived analysis-weighted AR and Taylor series 95% confidence intervals (CI). Our estimates indicate departures from the null. To illustrate, subtracting the AR estimate for 12-to-13-year-olds in 2004-2005 from the corresponding estimate for 12-to-13-year-olds sampled in 2017-18, the BDS-to-MD AR difference shows a 10.5% increase (95% CI = 8.2%, 12.8%). For 14-to-15-year-olds, AR increased by 13.2% (95% CI = 11.1%, 15.3%), and for 16-to-17-year-olds, 13.9% (95% CI = 11.7%, 16.1%). These novel estimates prompt us to infer that US evidence of increased MD prevalence during adolescence might involve BDS-to-MD

escalation. Notwithstanding limitations in our approach, we suggest research on non-toxic public health interventions when adolescents experience BDS, including group-and individualized cognitive-behavioral interventions—i.e., to achieve 'prevescalation' of subsequent progression and reduced risk of a Major Depression syndrome.

UNDERSTANDING RISKS ASSOCIATED WITH ELIZABETHKINGIA SPP.

Natalie Coaster

Epidemiology and Public Health, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 585
Mentor(s): Jade Mitchell (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Elizabethkingia spp. is a Gram negative, opportunistic bacterial pathogen found in the environment that infects the bloodstream, respiratory tract, and joints of immunocompromised hosts. Infection may result in sepsis and nosocomial pneumonia with a high mortality rate. In order to perform a risk assessment—which helps identify control measures needed to reduce spread in environment—a dose-response model is needed. A dose-response model is a tool that mathematically quantifies the relationship between doses and outcomes. This study develops a novel dose-response model for Elizabethkingia spp. from selected peer-reviewed experiments on the pathogenicity based on the intravenous exposure pathway. One data set measured the response of Black-Spotted Frogs intramuscularly inoculated with the bacteria and the other study addressed the response of Spiny Frogs inoculated with the bacteria subcutaneously. Death was the measured response in both studies. The beta-Poisson dose-response model was the best fit for all experimental data. The two frog studies could be pooled, and the final recommended model was beta-Poisson with an alpha parameter of 0.5248 and an N50 parameter of 237147. This dose-response model was used within a risk assessment for a case study of patients who developed Elizabethkingia infection from a hospital in London. The dose-response model, along with the case study analysis, better characterizes Elizabethkingia spp. risk, which will allow for risk management that limits the bacteria's growth ability and exposure.

HOW MIGHT RELAXED CANNABIS POLICIES BE AFFECTING AGE-SPECIFIC INCIDENCE OF CANNABIS USE?

Karthik Kolisetty

Epidemiology and Public Health, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 586
Mentor(s): James (Jim) Anthony (EPIDEMIOLOGY AND BIOSTATISTICS), Karl Alcover (EXTERNAL MENTOR), Olga Vsevolozhskaya (EXTERNAL MENTOR)

Globally, cannabis policies are relaxing. Legal age limits at 21 years might be ignored, with an expected downward shift in the age at peak risk for starting to use cannabis. For this epidemiological research project, we aim to estimate this age-specific risk, studying temporal stability and change in estimates for the United States (US). The population under study consists of non-institutionalized civilian 12-to-24 year old US residents, with sampling, recruitment, and assessment each year from 2002-to-2017 as part of the National Surveys on Drug Use and Health (NSDUH; n>20,000/year). Standardized computer-assisted self-interviews measured age and recency of cannabis onset as variables for NSDUH public-use-datasets, from which we calculated analysis-weighted cannabis incidence proportions and Taylor-series variances, followed by (1) visualization via plots and (2) summary estimates using (i) meta-analysis and (ii) Bayesian analysis approaches. Both approaches show relatively stable low cannabis incidence at age 12-13 years (<2% starting cannabis use), peak incidence in the mid-late teen years (~10%; 95% confidence interval, CI = 9%, 11%), followed by declining incidence (e.g., 4.9% at age 21 years; CI = 4.6%, 5.4%). Heterogeneity test statistics

indicate temporal variation, but no consistent evidence of increasing incidence across these years (except perhaps after age 20). In our discussion of these findings, we draw attention to study limitations as well as strengths. In our conclusions, we clarify how estimates of this type can be used in future evaluations of recent changes in cannabis policies in Michigan and elsewhere, as well as our directions for future research.

MANUAL AND AUTOMATED SEGMENTATION OF WHITE MATTER HYPERINTENSITIES IN HEALTHY ADULTS

Sameera Mahimkar
Epidemiology and Public Health, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 587
Mentor(s): Andrew Bender (EPIDEMIOLOGY AND BIOSTATISTICS)

White matter hyperintensities (WMH) are brain lesions that appear as focal areas of increased brightness in on T2-weighted MRI scans. Frequently associated with vascular risk factors, WMH are found in normally aging older adults and in patients with various neurological disorders. Manual delineation of lesions on fluid attenuated inversion recovery (FLAIR) data serves as the gold standard method for measuring WMH volume, but numerous computerized methods also exist. The most accurate of these, however, still requires the use of manually measured WMH data to train machine learning-based classifiers. Here, we manually segmented a subset of FLAIR data in large sample of healthy adults. A single rater-in-training first established their intra-rater reliability by comparing their manually traced WMH volumes on FLAIR data from 20 adults with measurements in the same subset two weeks later. Following demonstration of intra-rater reliability, we will use the manually traced lesion maps to train a newer automated method to detect WMH that classifies image voxels based on intensity and spatial features and the output signifies the probabilities per voxel being WMH. Our findings will be applied to different aging data sets to track longitudinal changes WMH volumes across adulthood.

ANALYSIS OF PRE/POST PARTUM DEPRESSION WITH VARIATION IN CHILD DEVELOPMENT

Dylan Pembroke, Jack Logan, Taha Muhammad-Ali
Epidemiology and Public Health, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 588
Mentor(s): Breanna Kornatowski (EPIDEMIOLOGY AND BIOSTATISTICS)

Research suggests that mothers experiencing depression before pregnancy and/or postpartum may have an adverse impact on development of the child during infancy and early childhood. The Child Health Advances from Research with Mothers (CHARM) collaboration consists of two longitudinal pregnancy cohorts reflecting various areas of Michigan: MARCH and ARCH. Because these cohorts recruit mothers during pregnancy, following the development of the child until adolescence, it provides an opportunity to analyze depression of mothers and its effects on child development pre and postpartum. 1,000 mothers were recruited as early as possible in pregnancy, of which were administered enrollment questionnaires containing the Edinburgh Depression Scale. During infancy, the same set of questions were repeated to analyze depression in the mothers. While the mothers were being asked about depression pre and postpartum, the development of the children was followed, focusing on cognitive and motor development. The results intend to provide analyses in two areas. The first of which is to compare depression scores prenatally and postpartum, relating to development delays in children earlier on. Upon the comparison of depression, the second focus is to establish a relationship between depression and parental education, ultimately affecting child development. Ultimately, the purpose of these analyses is

to identify potentially at-risk future populations and in turn, provide health-care professionals the means for more acute care for mothers suffering from depression, and thus mitigate the likelihood of developmental delays in children.

ACCESSIBILITY AND FUNCTIONALITY OF DATA COLLECTION: INVESTIGATING DIFFERENT AUDIO RECORDING DEVICES AS A MEANS OF FACILITATING PUBLIC HEALTH RESEARCH ABOUT NATURAL SOUNDS IN URBAN SETTINGS

Claudia Allou

Epidemiology and Public Health, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 589
Mentor(s): Amber Pearson (GEOGRAPHY, ENVIRONMENT, & SPATIAL SCIENCES)

Increasingly, health researchers are investigating the relationship of human contact with nature and resulting impacts on physical and mental health. As the research grows and evolves, the impact of natural sounds (e.g., birdsong, wind and insects) on mood, stress, pain and aid in recovery from surgery has become an emerging focus. Nearly all of the research has been conducted in laboratory or hospital settings. To investigate the relationship between to exposure to natural sounds and health impact in the field setting, robust quantification of the acoustic environment across a landscape is required. Amongst the few ecological acoustic measurements recorded in the field, most have been in wilderness and remote settings, rather than in urban settings. The industry-standard machinery used in those contexts are not only costly but large and are not conducive for mass data collection in densely populated areas. To determine viable alternatives, we have conducted a comparative test of three recording devices: Song Meter, Swift and Audiomoth. In the experiment, we used each device to compare the signal-to-noise ratio of three different common north-eastern urban bird songs (Northern Cardinal, Canada Goose, and European Starling), at five increasing distances from the device, and in three different urban settings (within East Lansing, Michigan). We will report the comparability of our measures and recommend a protocol for quantifying bird song in urban soundscape measurements. Evaluating the soundscape measurements among different devices is essential in facilitating the expansion and diversification in research of natural sounds as it contributes to public health issues.

OCCURRENCE AND DISTRIBUTION OF PYTHIUM INSIDIOSUM INFECTIONS IN THE UNITED STATES: A SURVEY OF THE LAST TWENTY YEARS OF EPIDEMIOLOGICAL DATA AT MSU

Don Nguyen, Khushi Kapoor, Noora Alali, Riann Rohn

Epidemiology and Public Health, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 590
Mentor(s): Alberto Mendoza (BIOMEDICAL LABORATORY DIAGNOSTICS PROGRAM)

The fungal-like oomycete, Pythium insidiosum, is the etiologic agent of pythiosis a life-threatening disease of tropical and sub-tropical areas that infects apparently healthy humans and animals. Although pythiosis is frequently diagnosed in dogs and in horses (occasionally in humans) inhabiting Southern States, so far, there are no epidemiological studies on its current distribution and prevalence in the United States. Our project took advantage of data, from the year 2000 to 2020, of studied cases in humans and animals collected at Michigan State University (MSU) and data available in PubMed at the National Center for Biotechnology Information (NCBI). Our data showed that pythiosis's incidence is high in Southern States. Florida and Texas with the highest number of cases, followed by Louisiana, Alabama, Mississippi, Georgia, South Carolina, Missouri, North Carolina, Tennessee, Arkansas Oklahoma, Kansas and. The disease was less frequent in Pennsylvania, Virginia, Kentucky, Illinois, Nebraska, New Mexico, Arizona, New Jersey, Wisconsin and California with few cases in Ohio,

Indiana, West Virginia, Maryland, Delaware and New York. The majority of cases were in dogs and horses with few cases in humans, cats, cattle, a bird and zoo animals such as camels and big cats. Our study showed Pythiosis, once considered a disease confined to latitude 35oN of Southern States, is now found in States above the 40oN latitude. This may be related to the fact physicians are more familiar with the disease and to global warming, favoring the spread of this thermophilic pathogen to northern areas above latitude 43oN.

PREDICTORS OF EARLY CHANGE IN PHQ-9 DEPRESSION SCORES FOLLOWING ACUTE STROKE: A SECONDARY ANALYSIS OF THE MICHIGAN STROKE TRANSITIONS TRIAL

Brent Strong

Epidemiology and Public Health, Oral Presentation
Section: 2, 11:00 AM
Presentation Number: 764
Mentor(s): Mathew Reeves (EPIDEMIOLOGY AND BIOSTATISTICS)

Introduction: Depression affects approximately one-third of stroke survivors and is associated with poor recovery. Predictors of changes in depression in the early transitional period following an acute stroke are not well understood. We conducted a secondary analysis of patients enrolled in the Michigan Stroke Transitions Trial (MISTT) to characterize factors associated with depression symptoms 90-days after returning home. Methods: MISTT was an open, parallel, randomized clinical trial testing the efficacy of social worker case management in improving outcomes following an acute stroke. PHQ-9 is a valid measure of depressive symptoms and was collected via telephone interviews 7 and 90 days after a patient returned home. Other key demographic variables were extracted from medical records. Multivariable linear regression was used to identify independent predictors of PHQ-9 score at 90 days using the GLM procedure in SAS. All analyses were adjusted for baseline PHQ-9 score at 7 days. Results: Of 265 patients enrolled in MISTT, 164 had PHQ-9 scores available at both 7 and 90 days and were included in the analysis. Baseline PHQ-9 score was a strong predictor of 90-day PHQ-9 score. In the multivariable linear model, not being married (β=2.4 [95% CI=1.0-3.8]), moderate stroke severity (β=2.3 [95% CI = 0.7-4.0]), and high stroke severity (β=3.0 [95% CI = 0.1-5.9]) were associated with an increase in depressive symptoms. Conclusions: Changes in post-stroke depression are influenced by multiple factors. Further study is needed to identify ways that post-stroke depression can be effectively managed.

DETROIT'S URBAN AGRICULTURE: ADDRESSING THE BARRIERS TO ADVANCING COMMUNITY HEALTH

Abigail Kuplicki

Epidemiology and Public Health, Oral Presentation
Section: 2, 11:15 AM
Presentation Number: 765
Mentor(s): John Aerni-Flessner (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

Both popularly and in scholarly work, urban agriculture has been praised as an apparent solution for improving food access and health outcomes in communities facing poverty, disinvestment, and barriers to food attainment. Proponents of urban agriculture promote many benefits of agriculture to these communities, including improvements in food security, community rebuilding, neighborhood safety, and economic development. In cities like Detroit, Michigan, with high rates of poverty, poor health outcomes relative to the surrounding region, and substantial vacant land, urban agriculture has the potential to play a significant role in providing both fresh produce and economic opportunities that can improve health outcomes for community members. But despite the apparent capacity for urban agriculture to advance community revitalization, my research assesses the barriers to realizing such benefits. Based on interviews with farmers in Detroit and a wide review of literature on urban agriculture, my research challenges the narrative that urban agriculture is necessarily beneficial to community

health. This project highlights challenges to successful urban agriculture implementation in Detroit, particularly those concerning land attainment, community engagement, and law enforcement. It also emphasizes the need for policies that support agricultural initiatives that promote, rather than hinder, community health. This research brings together interdisciplinary arts and humanities methodologies and evidence-based scientific approaches to envision a new future for urban agriculture as a public health initiative. The project argues that policymakers need to utilize interdisciplinary and community-centered approaches to urban agriculture to better bring benefits of such projects sustainably to low-income communities.

YOU EAT WHAT YOU ARE: DEMOGRAPHIC, LIFESTYLE, AND REPRODUCTIVE PREDICTORS OF DIET QUALITY IN PREGNANT WOMEN.

Melissa Henning

Epidemiology and Public Health, Oral Presentation
Section: 2, 11:30 AM
Presentation Number: 766
Mentor(s): Diana Haggerty (FOOD SCIENCE & HUMAN NUTRITION), Diana Pacyga (FOOD SCIENCE & HUMAN NUTRITION), Rita Strakovsky (FOOD SCIENCE & HUMAN NUTRITION)

Maternal diet during pregnancy predicts life-long health of mother and baby. Demographic and lifestyle factors (e.g. income, weight) influence maternal diet. However, little is known about important maternal characteristics that predict overall diet quality in early pregnancy. Therefore, our aim was to identify maternal demographic predictors of two important diet quality indices: the Healthy Eating Index (HEI) and the Alternative Healthy Eating Index (AHEI). HEI assesses diet quality using the Dietary Guidelines for Americans, while AHEI includes foods/nutrients predictive of chronic diseases. We also assessed whether differences exist in maternal predictors of HEI versus AHEI. We analyzed the data of 525 pregnant women from Illinois. At enrollment (10-14 weeks gestation), women completed an interview and questionnaire about their diet during the previous 3 months. To understand which demographic factors best predicted maternal diet quality, we tested for differences in HEI/AHEI scores based on maternal characteristics (significance: $P < 0.05$) while concurrently controlling for all other maternal factors. Our results indicated that maternal marital status, age, and education predicted maternal diet quality using both HEI and AHEI ($P < 0.05$). BMI predicted both indices, but more so AHEI. Income, anxiety, depression, and caffeine intake predicted HEI ($P < 0.05$), while number of children predicted AHEI ($P < 0.05$). In conclusion, various maternal demographic and lifestyle factors predict diet quality, but may differ depending on the dietary measure (HEI versus AHEI). Understanding predictors of early pregnancy diet quality is important for developing targeted dietary interventions to promote maternal and child health.

GENDER-AFFIRMING CARE: MEDICAL GATEKEEPERS, LGBTQ COMMUNITY HEALTH CLINICS, AND THE CONSTRUCTION OF THE "APPROPRIATE TRANS SUBJECT"

Jonathan Walkotten

Epidemiology and Public Health, Oral Presentation
Section: 2, 11:45 AM
Presentation Number: 767
Mentor(s): Julia Grant (JAMES MADISON COLLEGE), Susan Stein-Roggenbuck (JAMES MADISON COLLEGE)

Although early physicians in gender-affirming care were often motivated to provide relief to those experiencing gender dysphoria, doctors' understanding of trans health needs made the gender identity clinic a place fraught with anxiety for trans patients accessing care. This paper seeks to explore tensions between trans patients, community and activist organizations, and medical providers to uncover the role of formalized medicine in developing gender-affirming models of health. While recognizing the autonomy of trans

patients and advocacy groups, this paper also recognizes the individualistic and medicalized nature of trans health care; this paper seeks to distinguish trans health organizing from that of women's and gay liberation movements, providing focused analysis of the role of formalized gender-affirming care in contrast to community models of health.. With gender-affirming care often being of key importance to trans identity and trans rights organizing, this paper will uncover the role of LGBTQ community health clinics in advancing gender-affirming care, while recognizing their complicity with the broader medical community and their limited provision of gender-affirming health care services. Historical analysis of competing modes of trans health care and trans health organizing will provide a critical framework for understanding contemporary issues in trans health; although this paper will focus on the development of gender-affirming medicine in hospitals, university research centers, and community health clinics, this history speaks to current tensions in gender-affirming medicine, including the role of medical providers, the limits of bodily autonomy, and the position of community in advancing essential health care services for trans patients.

THE "AMAZON PRIME" OF BIRTH CONTROL: WEIGHING CONVENIENCE OF TELECONTRACEPTION AGAINST POTENTIAL HEALTH RISKS

Lauren Jernstadt
Epidemiology and Public Health, Oral Presentation
Section: 2, 12:00 PM
Presentation Number: 768
Mentor(s): Kathleen Lowenstein (PHILOSOPHY)

Telecontraception is an increasingly common and highly advertised example of convenience becoming a new normal in medical practice. Online pharmacies such as The Pill Club © and Nurx © carry over one hundred name and generic brand contraceptives that can be shipped right to the user's front doorstep. Convenience is a key reason why customers utilize services from telecontraception, but utilizing the technology may discourage users from visiting their physician or OB/GYN for necessary screening procedures. This presentation will explore the ethical implications of telecontraception, both in terms of increased access to care and in terms of a potential negative tradeoff between convenience and health. While the "subscription box" model of telecontraception has the potential to greatly increase access to care due to significantly reducing the wait time and costs as compared to visiting a physician in person, the potential drawbacks of not physically interacting with a physician merits further explorations. Dependence on an online care team for prescribing birth control could lead to lack of critical health screenings that could detect sexually transmitted diseases, cervical cancers, and human papillomavirus, among many others. This presentation will argue for the importance of weighing the implications for health against the potential for greater convenience, ultimately arguing that patients who utilize online pharmacies for their birth control refills should still schedule in-person appointments, amount dependent on age, with their health care provider to ensure that important health risk screenings are being fulfilled.

A SCOPING REVIEW: IMPACT OF HUMAN MILK AND FORMULA FEEDING ON METABOLITES IN HUMAN INFANTS

Wreeti Kar
Epidemiology and Public Health, Oral Presentation
Section: 2, 12:15 PM
Presentation Number: 769
Mentor(s): Sarah Comstock (FOOD SCIENCE & HUMAN NUTRITION)

The core diet of an infant in the first few months of life is human breast milk or formula. The small molecules or metabolites within this breast milk or formula diet can impact infant health. To understand how infant metabolites are affected by diet, a scoping review was performed. A scoping review identifies gaps in literature for the purpose of further research.

Within this scoping review, 24 articles were evaluated. All 24 articles focused on metabolites in infants fed breast milk, formula, or both. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines were used to determine study quality. STROBE guidelines are used to present information of what was done in an observational study clearly through a checklist of 22 items. Within the guidelines, these 24 articles were assessed on specific study eligibility criteria, the design of the research conducted, and other criteria. Two independent reviewers scored each manuscript using the STROBE criteria. All manuscripts received either neutral or positive scores from both reviewers and all articles were included in the scoping review. In the manuscripts, fecal, urine, and/or blood samples were collected. In breast fed infants, choline metabolites were elevated in urine samples. In formula fed infants, short chain fatty acids (SCFAs) and amino acids were elevated in stool samples. This review could indicate areas of more extensive research such as an controlled experiment to find a causal relationship between diet of the infant and overall health of the baby.

GLOBAL & AREA STUDIES

ISRAEL'S CHRISTIAN MINORITY

Aldo Buttazzoni

Global and Area Studies, Oral Presentation
Section: 1, 11:00 AM
Presentation Number: 839
Mentor(s): Yore Kedem (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

The Research I am focusing on is the life of Christians in Israel and how this identity shapes their everyday life. The ethnicities of Christians in Israel also vary and examining how those differences impact their religion, interactions with other groups, minorities and the majority, will be crucial in my understanding of what Christianity means. Other questions I plan on asking are: What are the differences and similarities between the minority groups here? What unique issues do Christians face here and what role does the government play in solving these issues? What parallels can be drawn in the life of minorities here and in Israel? And, what relationship does the Christian minority have with the Jewish majority have and how are these relationships preserved and/or changed?

AMERICA IN THE ISRAELI COLLECTIVE CONSCIOUS

Max Efros

Global and Area Studies, Oral Presentation
Section: 1, 11:15 AM
Presentation Number: 840
Mentor(s): Yore Kedem (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

During the summer of 2019, I had the opportunity to study in Israel. Israel plays an important part in not only international politics but American politics as well; America is home to the world's second largest Jewish population and is perhaps the Jewish state's most important ally. A considerable amount of Washington lobbying is dedicated to gaining support for Israel from politicians of both parties all across the country. In American public life, Israel represents many things to many different people. Public perception of Israel varies across generations, ethnic groups, religious affiliations, and political groups. Often, Israel can feel more like a political talking point than a complex nation that actual people call home. Does America occupy the same role in Israel as Israel itself does here in the United States? While in Israel this past summer during a study abroad trip, I had the chance interview a group of Israelis representative of the differences present in Israeli society. From Jerusalem to the Tel Aviv,

Israelis are not a monolith and their opinions of America's role in their lives shows not only what America means to Israel but what Israelis think about themselves.

THE EXPLORATION OF THE ORIGINS AND EFFECTS OF COLLECTIVISM IN CHINA AND ITS CONTRIBUTION TO THE ILLICIT INDUSTRY OF COUNTERFEITING

Joseph Longo
Global and Area Studies, Oral Presentation
Section: 1, 11:30 AM
Presentation Number: 841
Mentor(s): Jay Kennedy (CRIMINAL JUSTICE)

Product counterfeiting is a global issue, affecting nearly every market and industry. Counterfeit products are responsible for the loss of brand trust, billions of dollars in lost revenue, and even harm against consumers. Though intellectual property rights are recognized by nearly every state engaging in international trade, host nations and their citizens often have very different perceptions of the importance of intellectual property. In the case of China, the state has been privy to global intellectual property right law for decades. Yet, the country continues to be the predominant manufacturer of counterfeit goods. The purpose of this research is to further understand the role that Chinese imitation culture plays in the Chinese perception of intellectual property rights, taking a step further than the typical discussion on Chinese collectivism. Utilizing a contemporary lens, this project then investigates how the Chinese political system at present has created an environment that fosters the imitation of intellectual property. Finally, this project uses this knowledge to explore the social implications of counterfeiting. Though illegal, China's counterfeit manufacturing base likely employs millions of Chinese citizens. By understanding how an illicit industry provides benefits to typical citizens, this project aims to propose policy solutions that substitute these positive effects and further incentivize the state to enforce intellectual property rights.

QUINOA: PRODUCTION, CONSUMPTION, AND EFFECTS ON ANDEAN COMMUNITIES

Acacia Costales
Global and Area Studies, Oral Presentation
Section: 1, 11:45 AM
Presentation Number: 842
Mentor(s): Jennifer Goett (JAMES MADISON COLLEGE)

Over the last two to three decades, quinoa has shifted from a relatively unknown crop outside of South America into a beloved super food by countries in the global north, especially the United States and Europe. The crop, a nutrient and protein rich pseudo cereal, has been cultivated in the Andean region of South America for thousands of years. It serves as an important buffer food for the numerous impoverished Andean communities with little access to animal protein and other dietary necessities. The recent adoption of quinoa into the diets of the wealthy stems from its suitability for those consuming a plant-based diet as well as for those who need gluten free food choices. This uptick in consumption outside of the Andes has caused a rapid price increase for the once inexpensive crop. The controversy of the quinoa boom stems from the economic, social, and environmental effects of the crop, which have significantly impacted Andean communities. In this presentation, I argue that despite the increase in income for some quinoa producing areas, the rise in profitability of quinoa has promoted environmentally risky agricultural practices, dietary hardship for the urban poor especially, and extractionist and exploitative practices by corporate actors. These ill effects can be combated through the support of Andean communities: by investing in environmentally sustainable practices, respecting traditional cultural agriculture, and promoting fair wages and labor practices.

THE COMPLEX POLITICS OF WATER INSECURITY
Faizan Ali, Sarise Hammad
Global and Area Studies, Oral Presentation
Section: 1, 12:00 PM
Presentation Number: 843
Mentor(s): Stephen Gasteyer (SOCIOLOGY)

Water has a unique human value for human survival. Water insecurity is both a natural and a human-made phenomenon. In the contexts of Palestine over 85% of water is dominated by Israel, hindering Palestinian citizens to access their own water for basic human survival needs. Politics involved in water often drives the water insecurity that is faced in different places in the West Bank and the Gaza Strip. In our presentation we will address what water security in the context of three Palestinian cities; Ramallah, Tulkaram, and Hebron, looks like. We will also address how these certain Palestinian households address water scarcity in relation to gender roles and family stress. We have accumulated data from the studies of Birzeit University as well as the Institute of Environmental and Water Studies in Palestine, working along Michigan State Sociologist Professor, Dr. Stephen Gasteyer.

HEALTH SCIENCES

PRESSURE INJURY PREVENTION: IMPLEMENTATION OF SKIN CHAMPIONS IN THE INTENSIVE CARE UNIT
Megan Schoenberger
Health Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 115
Mentor(s): Jackeline Iseler (NURSING)

Hospital-Acquired Pressure Injuries (HAPIs) are sustained by millions of people in the United States and remains a significant and costly problem within our current healthcare system. Increased incidences of HAPIs in an intensive care unit (ICU) at a midwestern hospital warranted further exploration. An electronic, anonymous survey was distributed to the ICU nursing staff regarding their perception and knowledge of pressure injuries. Survey results identified a need to improve the nursing staff's confidence in staging pressure injuries, documentation, and understanding the Wound Ostomy Continence Nurse orders. It also identified unit resources were needed to understand and assess skin breakdown. This project will evaluate if Skin Champions is an evidence-based program to decrease the incidence of pressure injuries in patients who are hospitalized. Nursing staff and leadership strongly agreed in piloting a Skin Champions program to improve pressure injuries in the ICU. Skin Champions program allows "Champions", or specially trained nurse-leaders as a resource for skin concerns. These Champions implement preventative measures, educate staff, and identify barriers to providing evidence-based care. A literature review produced eleven scholarly articles on the utilization of Skin Champions and offer promising data, including substantially lowering incidences of HAPIs and increasing positive patient outcomes. The literature also shared methods for implementing the Skin Champions program. The hospital will embark on piloting the skin champions program on three units this Spring anticipating similar results. By focusing on education, communication, and prevention, a unit-based Skin Champion may decrease HAPIs at this midwestern hospital.

REDUCTION IN CLABSI RATES: COMPARING BIOPATCH DISK AND TEGADERM CHG
Ally Alfaro
Health Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM

Presentation Number: 116
Mentor(s): Jackeline Iseler (NURSING)

Central Line Associated Bloodstream Infection (CLABSI) is a serious infection that can contribute to around 28,000 deaths a year. Patients with a central line is at risk for CLABSI, which can be averted by preventable measures such as sterile technique, maintenance, discontinuing central lines when no longer indicate. One measure is to place a chlorhexidine gluconate (CHG) impregnated dressing, which is now the evidence-based standard practice to prevent CLABSI. The intensive care unit at a medium sized, midwestern hospital has encountered an increase in CLABSI and is currently investigating root causes of the increase. One potential cause of the increase was the recent change in CHG impregnated dressing product. Two medical companies manufacture CHG impregnated solutions to central line dressing, Biopatch®and Tegaderm CHGTM. The Biopatch®, manufactured by Ethicon, offers a CHG impregnated disc and the Tegaderm CHG™, manufactured 3M, is a CHG impregnated gel, both with a clear dressing to protect the insertion site. The purpose of this comparison study, is to evaluate the effectiveness of both products in decreasing CLABSIs at this midwestern ICU in a randomized control trial.

HEALTH PROMOTION, EQUITY, AND SUSTAINABILITY: HOSPITAL-BASED FOOD SYSTEMS INITIATIVES

Mia McPherson
Health Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 117
Mentor(s): Julie Cotton (PLANT, SOIL, AND MICROBIAL SCIENCES)

My presentation focuses on the strengths and weaknesses of hospital-based food system initiatives and reflects my experience at The Farm at St. Joes (Ann Arbor). Hospital-based food system initiatives are set to address diet-related illnesses and food insecurity, encourage community engagement and education, and promote ecological health through sustainable farming. However, identified issues such as insufficient data on the outcomes of community benefit programs, lack of emphasis on redistribution of power and acknowledgment of structural inequalities are potential weaknesses of initiatives. Achieving food justice and health equity will require both institutional and systemic reform and community involvement. Health care providers are uniquely positioned to advocate for healthy food initiatives at their institutions and within their communities, as well as for a food system that is sustainable and just. When implementing hospital-based initiatives centered around food, institutions must examine how race, gender, class, and other social determinants affect our access to and relationships with food. I am hoping to inspire dialogue such as fragmentation between health care systems, social services, and food systems and how hospitals can move forward in caring for the whole person.

PAIN AMONG BREAST CANCER PATIENTS UNDERGOING OUTPATIENT CHEMOTHERAPY

Brianna Steinbauer
Health Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 118
Mentor(s): Arienne Patano (NURSING), Horng-Shiuann Wu (NURSING)

Pain is a common symptom among cancer patients undergoing chemotherapy. The cause of cancer pain is multifactorial, and mechanisms are still unclear. Opioids remain the leading treatment in pain relief. The purpose of this study was to examine the prevalence of pain and interference among cancer patients undergoing chemotherapy. Data of this secondary analysis were collected from an observational study investigating 114 breast cancer outpatients. The mean age was 51.2 years old; most patients were Black; a third were

unemployed, and over half (52%) had advanced cancer (stages III-IV). Participants completed the Brief Pain Inventory on the day of their chemotherapy to report levels of pain and activity interference using a 0-10 scale. Descriptive analysis was used to analyze the data. National Comprehensive Cancer Network cut-off points were used: 0 (none), 1-4 (mild), 5-6 (moderate), and 7-10 (severe). Fifty-four percent of patients experienced moderate to severe pain on average. The average and worst levels of pain within the past 24 hours were 5.08 and 10, respectively. Although patients received analgesics for pain management, 68.3% reported insufficient pain relief. Findings also showed that within the past 24 hours, 79% of patients experienced interference with general activity to some degree (5.82± 2.854). Cancer patients in this study commonly experienced pain that interfered with daily life. Based on the findings, pain was not sufficiently alleviated with pharmacological interventions. Future research should investigate non-pharmacologic treatments for its effectiveness in pain management to improve daily function among breast cancer patients.

A PROGRESSION OF CARE FOR COMPLEX REGIONAL PAIN SYNDROME: A CASE REPORT

Katrina Langen
Health Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 119
Mentor(s): John Zubek (PHYSIOLOGY)

Complex regional pain syndrome (CRPS) is characterized by severe regional pain correlated to trauma to the region. This syndrome results in abnormal sensory, motor, sudomotor, vasomotor, and/or trophic findings and is twice as likely to occur in the upper extremity than lower extremity. The purpose of this case report was to describe the onset and treatment of CRPS in the left lower extremity. A 39-year-old Caucasian female participated in home health Physical Therapy following a mechanical fall that resulted in a left tibial fracture. The CRPS diagnosis was documented on the 13th visit of treatment. Symptoms included severe pain, loss of range of motion (ROM), loss of mobility and integumentary trophic findings (not consistent with infection.) The patient's personal goals included transitioning to an outpatient clinic and the ability to "be a mom again." Her functional goals included gaining mobility back, such as stand without assistance, normalize gait and ascend/descend stairs. A combination of treatments for CRPS were attempted including whole body strengthening, modalities, graded motor imagery, and drug intervention. Outcomes have included improved mobility and increased ROM in the knee. Her mobility status improved to modified independent and Tinetti score went from an initial score of 10 to 17. This case study provided valuable information about the progression of care from injury to development of CRPS diagnosis to current status. We conclude that a combination of treatments, which included graded motor imagery, resulted in this patient's progression towards achieving her initial mobility goals.

MOBILE APP USE AND THE MANAGEMENT OF CHRONIC DISEASES MANAGEMENT AND ADHERENCE TO DIETARY RECOMMENDATIONS AMONG AFRICAN AMERICANS

Teta Ukundwa
Health Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 120
Mentor(s): Kelly Brittain (NURSING)

Chronic disease rates for diabetes and high blood pressure are among the highest for African Americans. A method to decrease incidence rates of chronic diseases is improving adherence to dietary recommendations like the Dietary Approaches to Stop Hypertension (DASH) diet, a diabetic diet and/or the Mediterranean diet using a mobile app. However, there is limited research on the use of mobile apps for chronic disease management and adherence to

dietary recommendations to manage or prevent chronic diseases among African Americans. The purpose of this literature review was to examine mobile app use and the management of chronic diseases management and adherence to dietary recommendations among African Americans. CINAHL, Web of Science, and PubMed were searched resulting in 25 studies but only 14 met the inclusion criteria. Of the 14 studies, only four studies included African American participants. The results of those studies show that African Americans still find mobile apps challenging to use due to lack of confidence, or new features they have not seen or used before. Despite the challenges, after using a mobile apps for dietary recommendation adherence, participants reported that mobile apps are easy to use, and 60% of the population reported their family nutrition improved after using the mobile app.
he literature review results show that more research is needed to understand the feasibility, usability, and the effect of the use of mobile apps among African American to manage chronic diseases and/or the adherence to dietary recommendations.

CAN HOME-BASED EXERCISE PROGRAMS IMPROVE FUNCTIONAL CAPACITY IN HEART FAILURE PATIENTS?

Emily Gallagher
Health Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 121
Mentor(s): Pallav Deka (NURSING)

In patients with heart failure (HF), decline in cardiopulmonary function leads to decrease in the capacity to uptake oxygen. It is of interest to understand if low-to-moderate intensity exercise performed in a home-based setting can have an impact on maximal oxygen uptake (peak VO2) in patients with HF. To investigate if a home-based aerobic exercise program improves functional capacity in patients with heart failure. We completed a literature search using PubMed, CINHAL, and Cochrane Library using the key words "heart failure", "home-based", "peak VO2", "functional capacity" and "exercise". We found eight studies that investigated change in peak VO2 resulting from a home-based aerobic exercise program in patients with HF. Low-to moderate intensity exercise programs (mostly defined between 40-80% VO2 peak) included community and treadmill walking, cycling, and inspiratory muscle training. The length of the programs varied from 4 weeks to 52 weeks. Sample sizes ranged from 15 to 111 participants with an average of 35 participants. The average improvement in peak VO2 was 2.05 mL/kg/min with increases ranging from 1.1-2.72 ml/kg/min. Improvement in functional capacity also led to significant ($p<.05$) improvement in weight loss, increased exercise tolerance, blood pressure control, and body mass. For patients with HF, getting adequate moderate intensity exercise can help with improving functional capacity as measured by peak VO2. Long-term adherence is essential for sustaining improvement in peak VO2 levels. More research needs to be done to see how moderate exercise compares to high intensity exercise in the increase in peak VO2.

ASSESSING CAPACITY TO CONSENT IN PATIENTS WITH ALZHEIMER'S DISEASE: EMPIRICAL RESEARCH AND ETHICAL IMPLICATIONS

Nina Darwich
Health Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 122
Mentor(s): Jennifer Carter-Johnson (COLLEGE OF LAW), Robyn Bluhm (PHILOSOPHY)

The objective of this research is to compare Alzheimer's Disease (AD) patients' capacity to consent to treatment and research against AD patients' capacity to designate a healthcare

surrogate decision-maker. This distinction is important because patients may lack capacity to consent to treatment or research, while maintaining capacity to choose a surrogate. Many studies have examined AD patients' capacity to consent to research and to treatment. This presentation provides an overview of the empirical research on determining whether a patient with AD has the capacity to consent. The majority of the studies surveyed administered the MacArthur Competence Assessment Tool (MacCAT). Although this tool is widely accepted, it fails to consider a patient's values and is mainly concerned with cognitive abilities. There has been little research done on AD patients' capacity to designate a surrogate decision-maker; however, this review of the empirical literature provides insight into the abilities that must be considered in developing clinical tools to assess the capacity to designate a surrogate decision-maker. Michigan, among other states, does not have a default surrogate law stating who is able to make decisions on a patient's behalf if that patient is deemed incompetent and has no advance health care directive. It is crucial for an AD patient's surrogate to be someone that will make decisions in their best interests. Along with reviewing literature on capacity to consent to treatment and research as well as literature on capacity to designate a surrogate decision-maker, this presentation will also address related ethical and legal implications.

IS CLEARANCE TIME FOLLOWING SPORT-RELATED CONCUSSION INFLUENCED BY THE HEALTHCARE PROVIDER AND MEDICAL FACILITY?

Blake Maddalena, Luke Drieborg
Health Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 469
Mentor(s): Aaron Zynda (KINESIOLOGY)

This study examines sport-related concussion (SRC) and authorization needed to return to play provided by a healthcare professional (HCP). The purpose of this study is to 1) determine the frequencies for credentials of HCPs and the type of medical facility authorizing clearance and 2) determine if clearance time for athletes varied between HCP and medical facility. Kaplan-Meier survival curves and Peto tests assessed differences in time to authorized clearance between Doctor of Osteopathic Medicine (DO), Doctor of Medicine (MD), Nurse Practitioner (NP), and Physician Assistant (PA) in the following facilities: Neurologist's Office, Team Doctor, Primary Care Physician (PCP) or Pediatrician Office, Hospital, or Urgent/Ready Care. Subjects included high school student-athletes participating in Michigan High School Athletic Association (MHSAA) sponsored athletic events. Through the MHSAA Head Injury Reporting System, from 2015-2019, 16,001 (65.5% male) SRC cases were recorded with 12,856 (80.3%) of cases cleared to return to full participation. The median clearance time varied by HCP and medical facility, but the earliest authorized clearance was in Urgent/Ready Care (8 days; $p \leq .001$) and the longest authorized clearance occurred in the Neurologist's Office (14 days; $p \leq .001$). Most often, an MD at a PCP or Pediatrician's Office cleared athletes in the MHSAA to return to play; however, student-athletes received quicker clearance when evaluated by a PA or NP at an Urgent/Ready Care facility. Future studies should investigate why differences in clearance time and medical facility type exist.

COMMUNITY OUTREACH TO MUSLIM WOMEN TO IMPROVE BREAST HEALTH KNOWLEDGE: A LITERATURE REVIEW

Megan Murphy
Health Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 470
Mentor(s): Mary Smania (NURSING)

A literature review was conducted aimed to explore the population of Muslim American women to determine their incidence of breast cancer, morbidity/mortality, barriers to mammography screening and if community outreach efforts were effective for early diagnosis and screening. The databases CINHAL and PubMed were used to perform a thorough search of the literature to explore the current data on Muslim American women and their breast cancer incidence. Keywords such as breast, health, cancer, refugee, Muslim, Arab, Islam, outreach, and education were used to identify 136 articles and from those, seven of them were chosen for further review. Restrictions consisted of 2009-2019, published in the United States, all written in the English-language. Articles eliminated were those not addressing breast cancer. The literature showed that Muslim American women underutilize mammography screening and are undereducated in the area of breast health and breast cancer. The literature also revealed that that population reported a lack of knowledge on how to practice a self-breast exam and delineated factors relevant predictors of ever having a screening. Lastly, barriers were described as an absence of symptoms, lack of health insurance and the absence of family history. The literature also revealed that there are some interventions that have proven successful to increase breast health screening. Community outreach and culturally appropriate, mosque-based education were among the interventions that were found to be successful.

REPRODUCIBILITY OF LUMBOPELVIC MOTOR CONTROL IN HEALTHY INDIVIDUALS USING A NOVEL PRESSURE TRACKING TASK

Sloan Horejsi
Health Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 471
Mentor(s): Angela Lee (OSTEOPATHIC SURGICAL SPECIALITIES), John Popovich (OSTEOPATHIC SURGICAL SPECIALITIES)

Lumbopelvic control is considered an important factor in the treatment of low back pain (LBP). Previous studies have used a pressure biofeedback unit (PBU) to determine if clinically used isometric tasks are reproducible in participants with chronic LBP. However, most day-to-day tasks require dynamic movement. The purpose of this study was to determine the between-day reproducibility of lumbopelvic motor control using a PBU and dynamic tracking tasks. For this on-going study, five healthy individuals participated in a test-retest study to assess their ability to perform multiple tracking tasks in the supine and prone positions. For the supine task, the PBU was placed above the posterior superior iliac spine to monitor changes in pressure associated with movement of the pelvis in the sagittal plane (i.e., pelvic tilt). For the prone abdominal hollowing task, the PBU was placed above the anterior superior iliac spine and pressure was modulated by contracting and relaxing the transversus abdominis muscle. During the tasks, participants tracked a target displayed on a monitor by controlling the pressure of the PBU. Root mean square error (RMSE) between the target and participants performance was used to quantify performance on the two separate days. A paired t-test was used to test for statistical differences between days, which resulted in no significant difference ($p>0.05$) in RMSE. This preliminary result suggests the PBU tracking tasks developed in this study provide a reliable assessment of lumbopelvic motor control. Therefore, this methodology can be used in future research investigating individuals with chronic LBP.

WHAT PATIENTS REPORT ABOUT THEIR SYMPTOMS COMPARED TO HEALTH PROVIDER ASSESSMENTS

Kate Frederick
Health Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 472

Mentor(s): Gwen Wyatt (NURSING), Sarah Brewer (NURSING)

Symptom management for cancer patients is critical and must be based on valid data. However, cancer patient self-reported symptom severity will sometimes differ from the health care provider assessment in the medical records. The aim of this project was to evaluate the concordance of patients' self-report of symptom severity for 13 cancer and treatment related symptoms, and health care providers' documentation in the medical record. The symptoms included anorexia, nausea, vomiting, diarrhea, constipation, dry mouth, sore mouth, cough, dyspnea, anxiety, pain, and numbness or tingling. An unpowered subsample (n=10) of data was used. The parent study of 377 patients examined the impact of reflexology and meditative practice on cancer symptom management. Patients were randomized to both groups and completed the intervention at least once a week for 30 minutes. All patients completed a telephone interview regarding symptom severity at baseline and week 12. The medical chart audit and self-report questionnaires were reviewed by hand and 13 symptoms were collected from both sources. Overall, the self-reported data indicated higher severity than the chart audit data. This subsample finding is consistent with a report by this team on a previous study by Wyatt and Sikorskii (2012). The symptoms that were most similar between the two sources were vomiting, constipation and cough. While the most dissimilar symptoms were anorexia, dry mouth, anxiety, and insomnia. Medical charts are an important source of communication between members of the health care team. Charts that do not accurately reflect symptom severity may negatively impact patient care.

MSU BSN STUDENTS' KNOWLEDGE AND COMPETENCE IN EVIDENCE BASED PRACTICE

Bridget Owens
Health Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 473
Mentor(s): Kathleen Poindexter (NURSING)

Evidence Based Practice competencies are crucial among students graduating from BSN programs. EBP reduces medical errors and improve patient outcomes when care is based on best available evidence for practice. Studies have been conducted demonstrating where the gaps in Evidence Based Practice competencies lie within the nursing profession; however, no studies have been published exploring the competency levels in new graduate baccalaureate nursing students. This study aimed to determine what, if any, impact curricular enhancements had on senior level MSU BSN students' Evidence-Based Practice competence and knowledge. A comparative study was conducted across two cohorts of senior level BSN nursing students. After IRB approval, two weeks prior to graduation, students were invited to participate in a survey including 13 questions from the Evidence-Based Practice Competencies Scale (EBPCS) and 20 knowledge-based questions from the Evidence-Based Practice Knowledge Assessment in Nursing (EKAN). Demographic and two exploratory questions were included. Data was analyzed using an independent t-test and frequency responses. No statistically significant differences were found between the two cohorts. In cohort 1, the average score for the EKAN was 61%, and the average EKAN score for cohort 2 was 58%. This resulted in a difference that was not statistically significant. Students reported feeling EBP knowledge and competency in EBP is important for practice across both groups. Results provided by this comparative study indicate a need for enhancement of EBP education techniques in order to improve competency and knowledge level prior to graduation and entry into practice.

EFFECTS OF VACANT LOTS ON HUMAN HEALTH: A SYSTEMATIC REVIEW OF THE EVIDENCE

Caitlin Sivak, Piper Hurlburt
Health Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM

Presentation Number: 474
Mentor(s): Amber Pearson (GEOGRAPHY, ENVIRONMENT, & SPATIAL SCIENCES)

The corpus of research concerned with high-quality greenspace and human health indicates that greenspace promotes health in many communities across the world. What appears to be less understood is how poor-quality greenspaces (e.g., vacant lots) may influence health. While the research in this area is broad when taken together, there is yet to be a systematic review of the evidence to date. To inform future urban health professionals, we conducted a systematic review of the effects of vacant lots on human health, using PubMed, Scopus, and Web of Science with [(empty OR vacant OR abandoned) AND (lot* OR parcel* OR tract*) AND (human OR public) AND health OR "urban blight"] as search terms, registered with Prospero. Our search yielded 438 initial academic manuscripts which were then further screened to the 21 manuscripts included in this review. Of these 21 studies conducted between 2008 and 2019, most were carried out in the United States, particularly Philadelphia, Pennsylvania. Many (38.1%) studies concluded that vacant lots had both indirect (e.g., crime rates, insect vectors) and direct impacts (e.g., parasite infections, gun violence) on human health, which were statistically significant. In experimental studies (n=12), the 'greening' of vacant lots showed consistent improvements in both impacts on human health. Limitations of the current evidence indicate that future research could usefully expand the study sizes for both humans and vacant lots and utilize more quantitative measures of health outcomes when working with human subjects.

IMPROVING BIRTH OUTCOMES BY BECOMING DESIGNATED AS MOTHER-FRIENDLY: A QUALITY IMPROVEMENT PROJECT

Kamila Mendela
Health Sciences, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 475
Mentor(s): Joanne Goldbort (NURSING)

Maternal mortality is the general report card with regards to the quality of obstetric care. The United States ranks 48th in maternal mortality, and women have a higher risk of dying of pregnancy-related complications than those in 49 other countries with the increase in Cesarean births as a major contributing factor. The overall Cesarean rate in the US is 37%, which means 1 in 3 women may end up having a Cesarean. The Mother-Friendly Childbirth 10-Steps Initiatives (MFCIs) were developed by the Coalition for Improving Maternity Services (CIMS) in 1996, with the purpose to improve the birth process and birth outcomes for women, while also encouraging physiologic childbirth and increased breastfeeding rates. Mother-Friendly practices reduce maternal complications due to pregnancy and complications during hospitalized labor and birth; reduce Cesarean births among low-risk women to a rate of 15%; reduce the rate of maternal mortality; reduce rate of post-partum complications and re-hospitalizations. The MFCIs increase women's feelings of greater birth satisfaction, confidence, and ultimately long-term benefits to the mother, baby, and family. Implementation of this quality improvement project begins by healthcare providers using the MFCI Self-Assessment tool. The MFCIs represent the need for a paradigm shift from the medicalized birth model to the Mother-Friendly physiologic birth model. The MFCIs is an evidence-based collaborative process that aligns with current maternity care health quality initiatives supported by these professional organizations: ACOG, AWHONN, AAFP, ACNM, the Institute of Medicine, Joint Commission, the National Quality Forum and others.

DEMOGRAPHIC AND SOCIOECONOMIC DISPARITIES ON CHANGE IN FUNCTIONAL STATUS AMONG OLDER ADULT PARTICIPANTS IN THE HEALTH AND RETIREMENT STUDY

Fenta Asfaw

Health Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 655
Mentor(s): Ann Annis (NURSING)

Decline in functional status over time is an important issue in older adults. The functional change that occurs in older adults varies by ethno-bio-socioeconomic factors. This study aims to assess variation in the change in functional status among socioeconomic groups of older adults and assess whether certain groups were more likely to experience functional decline than others. Health status is strongly influenced by bio-socioeconomic factors. Thus, identifying factors contributing variation on the decline in function has significance for research on health disparities. Data was obtained from the Health and Retirement Study (HRS), a population-based U.S. survey of older adults. We conducted a retrospective longitudinal cohort study of 18,244 participants of 2010 and 2012 surveys. Independent variables included income, education, race/ethnicity, sex and age. Decline in functional status over two years was explored across these covariates. Change in functional status varies across different groups. Black and Hispanic individuals were more likely to experience functional decline (12.8%, 13.3%, respectively), versus whites (9.5%). Functional decline was also more common among those with high school or less education (64.2%) versus those with higher levels of education (35.8%). Among those with functional decline, the median income was $24,000 compared to $42,040 for those without decline. Disparity in functional decline is present among this cohort of older adults and thus, it provides information about important determinants of health. These findings will help guide future research on factors contributing to variation in functional status across different bio-socioeconomic groups of older adults.

RELATIONSHIP BETWEEN ADOLESCENTS' HEALTH LITERACY AND THEIR HEALTHY EATING BEHAVIORS, AND PERCEIVED FAMILY EFFICACY

Megan O'Brien

Health Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 656
Mentor(s): Tsui-Sui Kao (NURSING)

The purpose of this study was to determine the relationship between adolescents' health literacy scores and their healthy eating behaviors as well as their perceived family efficacy. A cross-sectional study was conducted with 158 parent-adolescent dyads from the Midwestern area of the United States via online Qualtrics survey. Adolescents' health literacy was assessed using the Newest Vital Sign instrument. In addition, adolescents were asked if they have eaten fruits and vegetables every day to assess their health behaviors. Finally, a 20-item 7-point Likert scale collective family efficacy scale was used to assess dyads' family efficacy. Of the 158 adolescents, 51 of them (32.27%) had achieved a perfect health literacy score. Adolescents with a higher health literacy score were less likely to try to lose weight by using diet pills or starving oneself (OR=.677, P=.021), eating fruits and vegetables every day (OR=.848, P=.130), or the child exercising for at least 60 minutes, 3 days a week (OR=.800, P=.030). Adolescent's health literacy score was not influenced by their parent's perception of their adolescents' health nor the parent and adolescents' perception of family efficacy (P=.674, P=.065, respectively). Low health literacy is still a problem among adolescents. Healthy literacy seems to predict adolescents' lifestyle (eating and physical activities). Parent-adolescents' family efficacy and parent's perception of their child's health did not coincide with the adolescent's health literacy.

LITERATURE REVIEW OF FACTORS ASSOCIATED WITH POSITIVE AND NEGATIVE PROFESSIONAL QUALITY OF LIFE IN NURSES

Alison Dunlap
Health Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 657
Mentor(s): Rebecca Boni (NURSING)

Professional quality of life (QOL) is a concept that considers the cumulative impact of a nurse's work on their compassion satisfaction and compassion fatigue. Compassion fatigue is a combination of burnout and secondary traumatic stress. The nurse's professional QOL can have an impact on the quality of patient care and their own well-being. An integrative review in CINHAL and Pubmed identified 19 articles over the past 9 years that examined factors associated with nurses' professional QOL. Professional QOL is measured in these studies with the ProQOL 5 scale. Indicators of good professional QOL include, but are not limited to, self-care habits, self-kindness, nurses feeling heard and/or appreciated by both patients and management, having a professional work environment and being part of a cohesive staff. Indicators of poor professional QOL include negative perceptions of self or position, poor self-care, not feeling heard or recognized by colleagues, and not being able to provide the care they would like due to limitations imposed by heavy workloads resulting in limited time to provide optimal care. There are also numerous inconsistent findings related to factors that are associated with positive and negative professional QOL. Inconsistencies can be attributed to variations between hospitals, lack of validity of ProQOL 5 with nurses and lack of conceptual clarity with professional QOL. Consistent findings can be used by health systems or individuals to implement practices that improve professional QOL. Research on this topic should be continued to better understand and measure professional QOL in nurses.

HAIR CORTISOL AND HEALTH-RELATED QUALITY OF LIFE AMONG LOW-INCOME MOTHERS

Teresa Ng
Health Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 658
Mentor(s): Jiying Ling (NURSING), Lorraine Robbins (NURSING)

Low-income mothers having young children experience increased stress, which adversely affects their health, particularly health-related quality of life (HRQOL). Hair cortisol concentration (HCC) is used as a biological marker for chronic stress; but to our knowledge, no study has examined the relationship between HCC and quality of life in low-income mothers. This study aimed to assess the relationship between stress and HRQOL among low-income mothers. A correlational study was conducted using convenient sampling of 35 mothers. Mothers' stress was measured with two measures: The Perceived Stress Scale, focusing on coping and distress; and HCC. HRQOL, including physical functioning, role functioning, mental health, social functioning, and pain, was assessed using SF-20. Data were analyzed using SPSS 24. Majority of the mothers had an annual income < $20,000. Mothers' HCC had moderate positive relationships with their physical functioning role functioning, health perception, and social functioning. Perceived distress was significantly and negatively related to health perception, while perceived coping was significantly and positively associated with physical functioning), role functioning, and health perception (ρ=0.35, p=.038). Compared to mothers with high HCC, those with low HCC reported having significantly lower physical functioning and health perception, but increased pain. Results from this study supports prior findings that HCC is an indicator of low-income mothers' coping abilities versus perceived distress. These results underscore a need for interventions

to improve low-income mothers' coping abilities to increase their HRQOL. Given the limitation of small sample size, the findings need to be interpreted with caution, and further investigation is warranted.

PARENT/GUARDIAN EVALUATION OF THE GUYS/GIRLS OPT FOR ACTIVITIES FOR LIFE (GOAL) SOCIAL NETWORKING WEB APP

Maria Cotts
Health Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 659
Mentor(s): Lorraine Robbins (NURSING)

This study aimed to test the feasibility and acceptability of a social networking web app intervention designed to assist parents/guardians in supporting their adolescent child's physical activity (PA) and healthy eating. Six parents/guardians and their young adolescents participated. After the 4-week intervention, parents/guardians completed a Qualtrics survey to evaluate the web app, and two parents were also interviewed. Response choices ranged from 1 to 4 or 1 to 5. Higher mean scores indicated a more positive response. Survey means and standard deviations for each category were as follows: Satisfaction: 3.50 of 4 (0.76); Easy to use: 4.17 of 5 (1.46); Functions were well-integrated: 4.33 (0.75); Liked seeing other postings: 4.67 (0.47); Like relating to others: 3.67 (0.47); Liked when others commented: 3.33 (0.47); Site helped me rise above problems that stop me from assisting my child with PA or eating healthy: 3.33 (0.47) and 3.67 (0.47), respectively; Site motivated me to help my child get regular PA or eat healthier 3.67 (0.47) and 3.67 (0.47), respectively. Suggestions made by both parents in the interviews included: adding a general feed updated in real time in chronological order; daily text reminder notifications to view new postings or complete tasks; incorporating different icons for reminders; and including more resources on the web app, such as more healthy food recipes. Overall, the web app was well-received by all parents/guardians. Additional research is needed to determine whether these improvements in the parents'/guardians' web app will result in increased PA and healthy eating among their adolescent children.

RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND HAIR CORTISOL: VARIED BY MOTHERS' HAIR CORTISOL LEVEL

Delaney Ruff
Health Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 660
Mentor(s): Jiying Ling (NURSING)

Low-income families are less likely to engage in physical activity, and one barrier related to physical activity is stress. However, literature on the relationship between stress and physical activity is inconsistent. This study aimed to examine the relationship between physical activity and hair cortisol concentrations (HCC) in low-income mother-child dyads. A cross-sectional, correlational study design was used. Prior to data collection, University Institutional Review Board and Head Start administrators approved the study. Thirty-five mother-child dyads were non-randomly recruited from two urban Head Start centers. HCC was assessed from hair samples collected from the posterior vertex of the head, and physical activity was assessed with the International Physical Activity Questionnaire for mothers and the National Health and Nutrition Examination Survey for children. The sample included 17.1% Hispanic, 54.3% Black, 60% single, and 37.1% unemployed mothers; and 22.9% Hispanic and 60% Black children. In mothers' low-HCC group, their HCC was negatively related to their physical activity and their children's physical activity. While in mothers' high-HCC group, their HCC was positively related to their physical activity and their children's physical activity. Children's HCC was

negatively related to their own physical activity. The varied relationships between mothers' HCC and physical activity by mothers' HCC level may indicate that higher HCC in low-income mothers may reflect their high perceived coping ability, which can act as a protective factor against children's stress. Although warranting further investigation, equipping low-income mothers with effective coping strategies may be a promising approach to increase both mothers' and children's physical activity.

USE OF THE 10-POINT PROFICIENCY CHECKLIST TO ASSESS CAREGIVER ADMINISTRATION OF MEDITATIVE PRACTICES: IMPLICATIONS FOR TREATMENT FIDELITY

Claire McCormick
Health Sciences, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 661
Mentor(s): Rebecca Lehto (NURSING)

The National Cancer Institute (NCI) funded Sequential Multiple Assignment Randomized Trial (SMART) study has a multipart protocol that necessitates standardized delivery of meditation or reflexology (intervention arm) with re-randomization at four weeks if fatigue improvement is not observed. Randomization of 331 patient/caregiver dyads into the treatment or control groups was required. For multi-site trials, it is essential that there are no procedural deviations in delivery of the study interventions. Thus, the purpose was to evaluate the 10-Point Proficiency Checklist to assess caregiver delivery of meditative practices in the NCI study that compares effectiveness of complementary practices for symptom management in cancer patients. In the meditative practices arm, the provider meets with the caregiver and patient twice to train the caregiver. After training, the intervener assessed the caregiver's competence using the 10-Point Proficiency Checklist where they would assign a point value to the observed performance of the caregiver. Checklist findings were reviewed to determine consistency in training and scoring across sites. Findings showed step two was the lowest scoring with a composite score of 95/100. Overall two Michigan sites showed the lowest overall scores on checklists with composite scores of 181/200 and 197/200 respectively. Treatment fidelity is an essential component of ensuring internal validity in cancer clinical trials, as it is a necessity to achieve to demonstrate that evidence-based practices can be attained in real clinical settings. The use of the 10-Point Proficiency Checklist is an important component for ensuring treatment fidelity management by identifying areas where training may be improved.

HISTORY, POLITICAL SCIENCE, & ECONOMICS

THE FORESTRY CHRONICLES OF THE AFRICAN DIASPORIC: THE STORIES, THE PERSPECTIVES, AND THE PEOPLE

Mia White
History, Political Science, and Economics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 17
Mentor(s): Asia Dowtin (FORESTRY)

The purpose of this project is to record the historic perceptions of forestry among Black Americans and South Africans as a means of understanding current perceptions of forestry among these populations. Comparative data will be collected from two study regions: Detroit, MI, USA and Gauteng, South Africa, Africa with data collected from populations of people born between 1946 and 2000 (ages ranging from 20-73). This data will determine attitudes towards defined urban trees, forests, and environmental efficacy as it relates to generational

trauma. Data from both locations will be collected in two ways: 1) with online questionnaires collecting categorical and ordinal data and 2) with in-person, semi-structured interviews to obtain word-of-mouth accounts of historic/contemporary environmental efficacy in the family. Data collection will occur over the course of one week in each place. Findings from this study are intended to foster deeper understanding of Black Diasporic relations with forests and natural spaces through discovery and documentation. This information is crucial to inform foresters, educational entities, natural resource supervisors, agencies/organizations seeking diversification or environmental equitorical activities about the attitudes of communities they serve. The findings can help assist efforts to green Black spaces by utilizing decisions and tailoring procedures based on how the recipients might feel and how-to best be included in such efforts for a successful outcome. This work will serve as a foundation for future studies delving deeper into Black perspectives of forestry and other ethnic minority groups.

DIVERSIFYING OUR HISTORIES: GATHERING STORIES FOR A MORE REPRESENTATIVE NARRATIVE

Lauren Driscoll
History, Political Science, and Economics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 18
Mentor(s): Julie Cotton (PLANT, SOIL, AND MICROBIAL SCIENCES)

There is increasing recognition that awareness of racial history affects the perception of current racism in history (aka Marley hypothesis). In the US and in Michigan, there is little acknowledgement of these realities in the historical stories provided by the conventional/dominant agricultural organizations such as the USDA, Farm Bureau, and FFA. To help expand and diversify this narrative, we partnered with the Michigan Food and Farming Systems (MIFFS) organization to collect stories from influential individuals in the organization's history. MIFFS has evolved to specifically serve underrepresented groups in agriculture, and by gathering these interviews, we have helped to reveal how the organizational history mirrors the emergence of greater awareness of racial disparities. We are building digital timeline tools that tell both the history of the MIFFS organization and the history of black farmers in Michigan to help bridge the gap in educational materials around race in agriculture and food systems.

POSSIBLE EMPLOYMENT FACTORS BEHIND DECLINING POPULATION IN THE UPPER PENINSULA OF MICHIGAN

Carson Honkala, Yida Yang
History, Political Science, and Economics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 19
Mentor(s): Michael Adetayo Olabisi (AGRICULTURAL, FOOD, AND RESOURCE ECONOMICS)

At the turn of the 20th century, the Upper Peninsula of Michigan (the UP) was a rapidly expanding supplier of natural resources, such as timber, iron ore, and copper ore. This economic boom was followed by a bust in the late 1910s, however, and the natural resource industry never met those heights again. Coincidentally, population in the UP has been declining steadily since 1920. Therefore, it is reasonable to assume that decline of employment in natural resource industries is a likely cause of this population loss. Fortunately, while almost every other UP county has followed a trend of decline, Marquette County has continued to grow. This allows exploration of the possibility that Marquette County's economic structure has changed in a way that allows it to continue growing, despite the UP's overall decay. Analysis of this idea was performed by comparing employment trends since 2000 in Marquette, Houghton, and Gogebic Counties, across various sectors. These sectors

included employment in the trades, the sale of natural resources, and service jobs. The data revealed a decline in trade and natural resource employment across all three counties, and an increase in service sector employment in only Marquette County. This reveals a correlation between increasing service sector employment and population. With this knowledge, future research on the subject could potentially assess the degree to which service sector employment affects population, and how that information could be used to stop the loss of population in the UP.

CASH IN HAND VERSUS PUBLIC OPTIONS: MICHIGAN HEALTHCARE POLICIES

Kevin Kraef
History, Political Science, and Economics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 20
Mentor(s): Matthew Grossmann (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH)

A government's responsibility is to the safety, security and general welfare of its denizens. This responsibility and how it should be carried out has come to the forefront of public and political debate in many forms within the modern American and Michigander political environment. One of these many forms includes the debate over healthcare. The political left favors a more robust public option that provides baseline, government-funded health insurance that covers drug prices, treatment options, and specialists. Other options, more traditionally favored by the political center and right include rewarding work and active participation in the economy through earned income tax credits (EITC). In studying either option within Michigan and other states like California, Massachusetts, and Texas; both have distinct benefits and drawbacks in their impact on our society, the economy, and our collective health. What is found during this analysis is how EITC may be a lower cost option and increase general public health, particularly among more economically challenged families, it is incapable of substituting public options provided by the government. EITC, however, can function as an effective policy supplement to lower the costs of medicare programs in the long run. Medicare has a high cost relative to EITC policies but yields better results for public health and economic prosperity, but through EITC the costs become more streamlined and both become effective tools to provide upward social mobility.

"KEEP YEMEN WEAK": SAUDI ARABIA'S INTERNATIONAL RELATIONS AND YEMEN'S CIVIL WARS

Ren Mueller
History, Political Science, and Economics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 21
Mentor(s): John Waller (HISTORY), Shahryar Minhas (POLITICAL SCIENCE)

Both civil wars in Yemen, the first during the 1960s and the second that is ongoing, have often been described as proxy conflicts between Saudi Arabia and, respectively, Egypt and Iran. Much has been written about each conflict individually, but far less has been written comparing the two wars. According to Neorealist thought, security concerns dominate the behavior of states, which explains why Saudi Arabia engaged in both conflicts. However, it does not account for the difference between Saudi Arabia's responses in each. This paper seeks to illustrate this difference using a variety of historical and contemporary sources and then explain it using international relations theories. Three explanations emerge, none of which are complete without the others. First, Saudi Arabia has increased resources at its disposal presently than during the 1960s. Second, the recent war can be seen as a diversionary tactic by Crown Prince Muhammad ibn Salman and his father King Salman. Third, as Structural Realist theories dictate, Saudi Arabia's actions are a result of the realignment of

the international system from a bipolar one during the Cold War to the increasingly multipolar present, a change that has significantly altered Saudi security calculations.

FOSSIL FUEL DIVESTMENT AND INVESTMENT BOARD POLICIES
Sasha Morgan
History, Political Science, and Economics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 22
Mentor(s): Matthew Grossmann (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH)

Fossil fuel divestment has become a growing concern among states and institutional investors. Climate change risk has created an increasing demand to divest financial assets from fossil fuel companies. The fossil fuel industry collects investments from a variety of institutions, including state and commercially owned corporations. Part of these investments come from employee pension funds that are then used to buy stock in the fossil fuel industry. Due to the increasing risk in climate change, pension fund portfolios are not only considered a high-risk investment, but also an environmentally damaging one. Additionally, there is no accessible route for pension fund savers to opt out of having their savings invested in fossil fuel companies. Because all divestment issues are enacted through the legislative process, state legislation is encouraged to regulate investment boards. Public monies continue to be invested into fossil fuels without an accessible route for savers to opt out. This research aims to provide a state-by-state analysis of investment board policies to enhance legislative action on divesting from fossil fuel companies and providing transparency to the pension fund owners.

SMALL BUSINESS AND ECONOMIC WELL-BEING
Ethan James
History, Political Science, and Economics, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 23
Mentor(s): Michael Adetayo Olabisi (AGRICULTURAL, FOOD, AND RESOURCE ECONOMICS)

Almost half of working Americans are employed by a small business. The proportion is even greater for the professional services sector, one of the most significant drivers of recent economic growth. Successful small enterprises represent the American dream for many, as entrepreneurs simultaneously create value and jobs for their communities as well as profits for themselves. To understand whether the presence of more small businesses improves local economic wellbeing in metropolitan areas, this study examines the correlation between the prevalence of small businesses—both in the overall economy and within the professional services sector—and unemployment rates and per capita income. This study uses the definition of Sector 54 (Professional, Technical, and Scientific Services) of the North American Industrial Classification System (NAICS) for the professional services sector. The findings, determined using data from 370 Metropolitan Statistical Areas (MSA's) of the United States, show that a higher proportion of small business firms in a region, both overall and within Sector 54, correlates with greater economic wellbeing. The proportion of workers in the overall workforce employed by such companies shows no such correlation, and the proportion within Sector 54 shows a negative correlation with local per capita income. Having large technology firms in an area confounds this correlation by simultaneously driving economic growth, encouraging the creation of new small businesses, and drawing in employees of the professional services sector (NAICS Sector 54).

SEEKING SHELTER: WHERE ARE MICHIGAN'S HOMELESS SHELTERS?
Katie Anderson
History, Political Science, and Economics, Poster Presentation

Section: 2, 3:00 - 4:30 PM
Presentation Number: 565
Mentor(s): Matthew Grossmann (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH)

According to HUD's 2019 Annual Homeless Assessment Report to Congress, Michigan's homeless population in 2019 was 8,575. Moreover, 92.3% of these people were sheltered, meaning that they received housing through emergency shelters and transitional housing programs. Shelters are one of the most direct means of providing assistance to those facing housing insecurity. However, the location and type of shelter does not always coincide with the needs of the surrounding communities. This study tracks homeless shelters across Michigan, investigating where homeless shelters are across Michigan in comparison to the state's homeless population. Finally, this study will also consider the different types of shelters throughout the state, including gender and family restrictions and how that impacts the types of services provided.

SUBMITTING SOLO TO SCOTUS: INDIVIDUAL ATTORNEYS' BRIEF SUBMISSION

Lauren Bolt, Madeline Broderick
History, Political Science, and Economics, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 566
Mentor(s): Ryan Black (POLITICAL SCIENCE)

Attorneys submit thousands of arguments, or briefs, to the Supreme Court of the United States each year. The first round of briefs are written to convince the nine justices to vote to allow an appearance before the Court. A second round of briefs are then submitted to encourage the justices to vote in their favor. The attorneys who submit briefs to the Supreme Court often do not submit alone- with either attorneys from other law firms, or their affiliated law firm. However, there are several attorneys who submit a brief without an affiliated law firm. We want to know why. We analyze attorney data from Supreme Court briefs from 1979 until 2008 in order to identify the attorneys who submit briefs without a law firm affiliation. First, we want to know if the respondent or the petitioner have more attorneys submitting briefs alone. Then, we want to find out if the individual attorney is linked to a law firm not reported on the brief. If there is, we will look into the law firm's success rate within their own brief submissions to the Supreme Court to determine why the attorney omitted their firm when submitting their brief. We expect to find that several of the attorneys, primarily women, on the petitioner's side omit their law firms in order to separate themselves from their firms due to a low rate of successes before the Court.

AMICUS BRIEFS AND STATE ATTORNEYS GENERAL

Josie Jasmin, Maysa Sitar, Sydney Darnall, Tyler Hoguet
History, Political Science, and Economics, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 567
Mentor(s): Jessica Schoenherr (POLITICAL SCIENCE)

Amicus curiae briefs and their impact on the United States Supreme Court is an area of increasing interest among political scientists. This is largely due to the dramatic increase in amicus filings and Supreme Court justices' use of those filings during the late twentieth and early twenty-first century. Between 1946 and 2012, the average amicus filings per case increased from 1 to 10. This proliferation of amicus briefs has had a marked effect on the Court, as Pacelle and Scheb have demonstrated that amicus briefs influence judicial behavior, especially that of moderate justices. During the 2017-2018 term, justices cited amicus briefs in 23 majority opinions, 5 concurring opinions, and 21 dissenting opinions. Amicus briefs have been filed by all types of institutions and individuals, including think tanks, special interest groups, and individuals with an interest in the affairs of the Court. One of the most prominent

filers, though, are the various state attorneys general that file briefs with the Court on behalf of their respective states. Harper has demonstrated that state-filed briefs have increased in both filing and citations in Supreme Court opinions, making them a potential key group to study in order to understand the justices' behavior. This study seeks to identify trends in amicus filings by state attorneys general, including method of appointment, party affiliation, and the types of cases in which the briefs are filed. We also seek to identify the impacts and implications of these trends.

EVALUATING THE SUPPLY SIDE ARGUMENT: A MALAWIAN CASE STUDY

Gifty Owusu-Tawiah
History, Political Science, and Economics, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 568
Mentor(s): Michael Wahman (POLITICAL SCIENCE)

Studies have found that voters do vote for male and female candidates for political office at equal, with some studies even concluding that voters may even vote for women at greater rates than men. This poses the question: why is there still an underrepresentation of women in political office? Two main arguments have been used to explain the underrepresentation of women in political office. The demand side argument answers this question by focusing on the demand or preference for female candidates in political positions. A common solution for the demand side argument is the implementation of gender quotas. The second main argument focuses on the supply of female quality candidates. A common solution for the supply side argument is the implementation of programs and campaigns that aid in producing quality female candidates. Some key factors that do shape the supply of female candidates include resources such as money and time, as well as the overall interest and ambition in politics for women. Some campaigns such as the 50:50 campaign in Malawi have taken the initiative to supply a greater amount of quality female candidates. The 50:50 campaign has a mission that "aims at increasing women's representation in leadership and decision-making positions, at the national and district level". This study uses data from the Malawi Candidate Survey (MCS) which surveyed 375 randomly selected candidates in which 73 female responses were represented, along with candidate interviews in an attempt to analyze the effectiveness of the supply side solution.

FROM THE SHWE TO SUU KYI: UNDERSTANDING MYANMAR'S RECENT POLITICAL TRANSITION

Lockie Woods
History, Political Science, and Economics, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 569
Mentor(s): John Waller (HISTORY)

In 2015, one of the world's longest-standing military dictatorships came to an end. After taking control of Burma in 1962, the military ruled through various different leadership arrangements for the next fifty-three years. On November 8, 2015, that sustained period of oppression came to an end when the National League for Democracy (NLD) party—led by Suu Kyi—almost swept the country's first legitimate election in over half a century. Many scholars have attempted to explain this recent political transformation, pointing to a variety of factors such as the threat of political dissent, economic backwardness, and overreliance on China, but a consensus remains elusive. Any attempt to properly analyze this transition must recognize the historical context behind the decisions leading to the NLD's rise to power. Accordingly, this presentation will seek to provide a detailed account of the contemporary and historical situation in Myanmar and use this to develop an explanation for the country's recent political change. After exploring the extent of political change in Myanmar, the paper

analyzes the most pertinent political, economic, and military developments that occurred between 1990 and 2014. This analysis shows that the best explanation for this surprising transition comes from contemporary studies of military regimes which suggest that they prioritize continuity of the military over political power. The nature of military regimes and specific actions taken by Myanmar's military after transition both lead to the conclusion that the regime willingly chose to relinquish power in the face of internal divisions and declining legitimacy.

AMERICAN INCOME SORTING AND THE RISE OF POPULISM

Chloe Weigel, Emma Stanavich, Sean Cottrell
History, Political Science, and Economics, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 570
Mentor(s): Michael Adetayo Olabisi (AGRICULTURAL, FOOD, AND RESOURCE ECONOMICS)

In this paper we analyze the growing geographic concentration of economic gains in the United States and explore the extent to which globalization and manufacturing downturn have contributed to this pattern of income sorting. It has become increasingly popular to profess that gainful employment and prosperity in the new liberalized economy are now concentrated on the coasts of the United States, with a growing sentiment, especially in the Midwest and Appalachia, that others have been "left behind" in this process. We turn to some notable economic literature and examine their attempts to explain relevant trends in offshoring, automation, and evolution in the labor market, which provide useful insights into the validity of these economic frustrations. We then further this analysis by exploring data collected from Cleveland and San Francisco as two contrasting examples that illustrate the widening gaps in American society and elaborate on some possible root causes behind this divergence. Lastly, we examine the pressing implications of this redistribution of wealth with respect to recent political balkanization and growing populist sentiment: especially across former manufacturing hubs in the Midwest.

IMPACT OF SOVIET DEPORTATIONS ON LATVIAN NATIONALIST MOVEMENTS AND THEIR ROLE IN COLLECTIVE HISTORICAL MEMORY

Emily Zvirbulis
History, Political Science, and Economics, Oral Presentation
Section: 3, 9:00 AM
Presentation Number: 730
Mentor(s): Matthew Pauly (HISTORY)

Between 1929 and 1952, the Soviet Union deported 8 million people of various nationalities, among them 80,000 Latvians. These deportations had a profound impact on Latvian social and political culture, and later became symbolic of the cruelty and oppression of Soviet occupation. This research projects analyzes the impact of the deportations on Latvian nationalist movements and their role in collective historical memory. It draws from Latvian and English-language sources, as well as personal interviews with people who lived under Soviet occupation in Latvia and have family histories impacted by Soviet repression. A classic trope in nationalist movements is emphasizing the suffering of one ethnic group at the hands of another. In the case of Latvia, the Soviet years are remembered as a dark time of oppression and suffering. Latvian nationalism prioritizes a distancing from Russia and the Soviet past, and the Soviet deportations are emphasized as an example of the crimes committed against Latvians during Soviet rule. The deportations play an important part in maintaining that Soviet rule was cruel, unjust and anti-Latvian. By emphasizing the relative prosperity of other nationalities, whether it be economic, social or political, nationalist movements are able to gain support and establish legitimacy as advocates for the rights of a people. Beginning in the late 1980s, the Soviet deportations became a tool to represent the

suffering and oppression of Soviet times in the collective memory of the Latvian state, helping to justify a break from Russia and a political and economic reorienting towards Western Europe.

STATE PARK FUNDING IN THE MIDWEST: A CASE STUDY OF ILLINOIS AND MISSOURI STATE PARK SYSTEMS

Tyler Hoguet
History, Political Science, and Economics, Oral Presentation
Section: 3, 9:15 AM
Presentation Number: 731
Mentor(s): Alan Arbogast (GEOGRAPHY, ENVIRONMENT, & SPATIAL SCIENCES)

State Parks are a public good provided by states to offer conservation and recreational opportunities to their citizens. State Park funding is ultimately a result of political choices, and understanding how and why states choose to fund their state parks is important to understanding spending on conservation as a whole. Missouri, a historically conservative state, provides adequate funding to their state parks and has one of the finest state parks systems in the country. Illinois, a historically democratic state, has struggled to properly fund their state parks in recent years. This paper seeks to understand this political paradox by analyzing the histories of the two state park systems while detailing the current political forces that shape their development. Missouri State Parks first encountered funding problems during the 1980s, and through the efforts of the Missouri Parks Association they were able to mitigate these concerns. Illinois State Parks encountered major funding problems in the 2000s, and they were never able to address these concerns in the context of the Recession. Despite having a budget per capita 20% less than Illinois, Missouri has twice the funds earmarked for conservation in the state. Furthermore, Missouri State Parks concentrate funds in areas of geographic importance while Illinois State Parks concentrate their funds in population centers. Finally, this paper details why Missouri supports conservation more than Illinois by discussing the relative wilderness participation rates between the two states and the impact of the urban and rural divide.

"THIS PLACE IS A MESSAGE" : RESPONSIBILITY, SCIENCE FICTION, AND THE HUMAN INTERFERENCE TASK FORCE

Eric Baylis
History, Political Science, and Economics, Oral Presentation
Section: 3, 9:30 AM
Presentation Number: 732
Mentor(s): Helen Veit (HISTORY)

In 1980, during the final, terrifying crescendo of the Cold War, the United States Department of Energy partnered with the Bechtel Corporation to bring together a unique team tasked with engineering a message capable of withstand a journey through distant time. Vast lagoons of radioactive waste were prepared to enter their tombs far under the earth. The culmination of years of engineering, these deep geologic waste disposal sites would secure the most dangerous waste products ever produced by man. One responsibility remained: Physicists, semioticians, archeologists, engineers, physicists, and anthropologists would design the means to prevent human interference with this waste. To secure them for all time, to perform this civilization's due diligence, the Human Interference Task Force blended science and science fiction to find the answers. For a brief window in the late 20th century, a small group of specialists imagined how to speak with humans across a vast gulf of time. This slice of history is just shy of science fiction, a tale of environmentalism and bleeding edge technology, and the final responsibilities binding humanity across eons. It is a fascinating exploration of an obscure and compelling historical moment, assembled from government documents and the notes left behind by the participants, and a narrative of moral

responsibility, applied imagination, and the attempt to build a monument not to our glory but our ignominy.

PUBLIC TRANSIT: AN EVALUATION OF TRANSPORTATION INEQUITIES IN THE BALTIMORE AND DC-METRO AREAS

Erika Ramirez
History, Political Science, and Economics, Oral Presentation
Section: 3, 9:45 AM
Presentation Number: 733
Mentor(s): Sarah Reckhow (POLITICAL SCIENCE)

Following the 1950s and 1960s, transportation policies have favored highway development over public transportation, in correlation with the trend of suburbanization. These trends have demonstrated inequitable effects on minority and low-income populations maintained by factors of residential segregation. Patterns of defunded public transportation proposals serving low-income, minority communities, and funding of projects serving higher concentration of white residents reflect the inequities of transportation policies. This paper serves as an evaluation of transportation inequities in the Baltimore and DC-Metro Areas, as a central case study. The Current Governor of Maryland proposed a $345-million cut for public transportation, resulting in the defunding of a proposed 14-mile, $2.9 billion rail line in June 2015, which would have served a predominantly minority population in Baltimore. Despite these cutbacks, public transportation proposals serving majority White communities survived the restraints on budget. This research suggests that trends of transportation policy relate to practices which are reinforced by products of racialized systems of residential segregation leading to inequitable effects on low-income, minority communities.

POSTMODERN PRESIDENT

Dominick Violetta
History, Political Science, and Economics, Oral Presentation
Section: 3, 10:00 AM
Presentation Number: 734
Mentor(s): Benjamin Kleinerman (JAMES MADISON COLLEGE)

The presentation will be on what exactly the postmodern president means. Traditionally, the literature on this subject has centered around a Neo-Neustadtian perspective; the power of the president comes from the ability to negotiate and bargain. This strain of thought treats politics as a product of social forces, and thus boils down politics to competing wills. Similarly it's theory of the postmodern president is limited, as it only describes a breakdown of the modern president's ability to negotiate. Instead I intend to use the frameworks of Jeffery Tulis and Leo Strauss, treating politics as a shared realm that the president upholds. Jeffery Tulis outlines the Rhetorical President, the ideas that in the earliest formation of the president the office was super-partisan (in that is was above the concept) representing the democratic people's will toward safety. Eventually the office shifts into a rhetorical role, the president seeks to both be the arbiter of a national policy dialogue as well as advance specific policy agenda. This president still claimed to represent a political good, and in such a way represented all Americans. However, we see a contemporary politics defined by cruelty for the sake of itself. Leo Strauss's German Nihilism provides the best way to view this problem, the breakdown of a sense of shared good and progress, leading to a truly postmodern president. The president no longer works for a shared good, but using power to destroy, and Trump represents the possible new normal in this respect.

OVERCOMING WITH STABILITY AND STRENGTH: THE BETHLEHEM TEMPLE'S ROLE IN THE AFRICAN AMERICAN COMMUNITY'S STRUGGLE AGAINST URBAN RENEWAL

Berkley Sorrells

History, Political Science, and Economics, Oral Presentation
Section: 3, 10:15 AM
Presentation Number: 735
Mentor(s): John Aerni-Flessner (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

The construction of Interstate 496 forcibly relocated families between 1964 and the summer of 1966 in the community around the Main Street/ St. Joseph's neighborhood in Lansing. As traffic roars across I-496 through downtown Lansing, the effects of this Urban Renewal and stories of the families who used to call these neighborhoods home remain largely untold. Using records found in the Stebbins Real Estate Collection at the Capital Area District Library, I have worked to highlight the importance that cultural hubs like the Bethlehem Temple Church located at 835 W. Main played in maintaining a sense of community among families forced to relocate. Tracing the various moves of the Bethlehem Temple Church and its congregants who lived near it on W. Main St. in the 1930s forms a clearer narrative of the persisting vitality within Lansing's African American community despite active displacement from their homes. While the stories of these individuals and the wider community need to be told so that people can better understand the harmful impacts of programs such as Urban Renewal, they do not limit the ways that African American residents saw themselves or their communities. The physical presence of the neighborhood may have been ultimately removed, but the deep bonds established within it through the cultural hubs and institutions within the community like the Bethlehem Temple allowed for its own kind of renewal—one of ultimate stability, longevity, and a thriving African American community in Lansing.

THE PROVENANCE OF AN ASTROLOGICALL PREDICTION OF THE OCCURRANCES IN ENGLAND, PART OF THE YEERS 1648, 1649, 1650 BY WILLIAM LILLY, STUDENT IN ASTROLOGIE

Montanna Ziems

History, Political Science, and Economics, Oral Presentation
Section: 4, 11:00 AM
Presentation Number: 736
Mentor(s): Liam Brockey (HISTORY)

Provenance, in the context of books, is the history of ownership of a book. By studying the provenance of a book, more information can be gained about the context in which the book was written as well as the history of how people were interacting with the book and its contents. The provenance of An Astrologicall Prediction of the Occurrances in England, Part of the Yeers 1648, 1649, 1650 is important because information about people were interacting with the events of the time period can be learned through how the reader interacted with the text, as well as finding out how the history of this book began in 17th century London and ended up at Michigan State's library in 2020. Research on this book was done by close interaction and analysis of the book, as well as using blacklight technology to uncover hidden annotations. I will be presenting on the creation of the book, the history of ownership from its first owner through its acquisition by Michigan State University, and the significance of why this book was written.

HISTORY OF THE BOOK: USING PROVENANCE TO RECONSTRUCT THE CHAIN OF OWNERSHIP FROM THE PRINTING PRESS TO PRESENT DAY

Katelin Ivey

History, Political Science, and Economics, Oral Presentation
Section: 4, 11:15 AM
Presentation Number: 737

Mentor(s): Liam Brockey (HISTORY)

Books tell stories, and not just through what is printed on their pages. Among the rare books found in the Special Collections section of the MSU library are many filled with provenance. Meaning the markings, illustrations, and writings within the pages that make a particular edition of a text unique to another of the same book because of its distinctive signs of use which provide insight into the lives of its owners. Examined in this study is John Bossewell's Workes of Armorie, an explanation of heraldry filled with brilliantly colored coats of arms. By tracing the markings in the book as well as other signs of ownership, like bookplates, the links in the chain were pieced together in order to better understand how the book was used by its owners but also how it survived over the decades between its publication in 1572 and its arrival at Michigan State University in 2016. Examining the evidence of ownership inscribed or impressed into this three-hundred-year-old work, I discovered several instances of different owners whose lives and names have been memorialized through the provenance they left on and between the pages.

HOW DEMOCRACY DIFFUSES: MEASURING THE EFFECTS OF DEMOCRACY PROTESTS ON ATTITUDES & BEHAVIORS IN AFRICA

Anthony Luongo
History, Political Science, and Economics, Oral Presentation
Section: 4, 11:30 AM
Presentation Number: 738
Mentor(s): Jeffrey Conroy-Krutz (POLITICAL SCIENCE)

The spread of democracy has occurred in waves, suggesting the importance of international factors in triggering democratic change. Some scholars focus on geopolitical and economic factors such as economic crises or the end of the Cold War, which created colossal challenges for autocrats and often led to democratization. Our project fits more with the academic literature on demonstration effects (also known as diffusion), in which citizens of one country are inspired emotionally and/or strategically by the ousting of incumbents in other countries. While this process is well-documented qualitatively in cases like the Arab Spring, it is a difficult process to test directly, especially at the individual level. We focus on African countries and incidences of incumbent defeat at the ballot box, a rare event that has only occurred in about one in six African presidential elections since 1990. Our theory suggests that such events will diffuse beyond the countries in which they occur, by making populations across the continent more supportive of democracy, more engaged, more willing to challenge their own leaders, and more confident in their own political efficacy. We test our theory using a natural experiment approach, leveraging overlap between Afrobarometer public opinion data and the occurrence of elections in other African countries.

EVERYTHING HAS A PRICE: MONEY IN CONGRESSIONAL ELECTIONS IN MICHIGAN

Ben Raab
History, Political Science, and Economics, Oral Presentation
Section: 4, 11:45 AM
Presentation Number: 739
Mentor(s): John Waller (HISTORY)

Money is more important than ever in politics. It allows for candidates to directly interact with the voting population through different means, including advertisements on T.V. and sending mail. Candidates receive the money they need from many different sources, including their political party, PACs, and individual donations. Additionally, there is outside spending done by dark money organizations hoping to influence the election results. Overtime, due to amendments to laws and court decisions, the impacts and amounts of money in elections has changed. This research explains the basics of money in United States House of Representatives elections in Michigan.

INSTITUTIONAL FACTORS OR SEXISM?: WHY MORE REPUBLICAN WOMEN AREN'T ELECTED TO PUBLIC OFFICE

Bailey Tjolsen
History, Political Science, and Economics, Oral Presentation
Section: 4, 12:00 PM
Presentation Number: 740
Mentor(s): Matthew Grossmann (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH)

Since the 1980's, the partisan gap amongst women elected to the US House of Representatives has grown tremendously. The number of women in Congress is also increasing, but this is made up of primarily Democratic women. Even in the record-breaking 2018 midterm election, only a tiny fraction of the many women elected to Congress were Republicans. Democratic women far outnumber Republican women in Congress, and in elected office, generally. This presentation attempts to explain why this is, as well as provide potential solutions for closing this gap, using existing research in the field as a basis for my own.

MAPPING THE MINDS OF DETENTE

Brett Binkowski
History, Political Science, and Economics, Oral Presentation
Section: 4, 12:15 PM
Presentation Number: 741
Mentor(s): Alice Lynn McMichael (HISTORY)

Whether approached from the perspective of the broad Cold War or the particularisms of American foreign policy, few topics seem to generate ambivalence among scholars of international relations quite like the 1970s Détente Era. On one hand, the very term "détente" marks this era for a relaxation of tensions across the Iron Curtain. Yet on another hand, more globally oriented scholars mark this era for an intensification of Third World interventions in the name of Cold War interests. While engaging in such debates, one of the natural responses is to delve into the primary sources and proceed to ask one of the most perennial yet elusive questions in historical inquiry: what was on the minds of those in political power? This project quantifies and visualizes the relative significance of peoples around the globe in the minds of chief foreign-policymakers in the Ford (and late-Nixon) administrations. In this presentation, I will show how methods of "distant reading" can change our understanding of historical actors. I will explain how digital text analysis can be used to extract the number of times various countries were mentioned in the Memorandums of Conversation stored at the Ford Presidential Library. Then I use interactive mapping to show where those in the executive branch focused their attention. Ultimately, my method of digital inquiry reveals a cognitive disconnect, with the countries the executive branch thought were worth discussing reflecting their perceptions of relative power, rather than being proportional to sites of US foreign policy actions and interests.

HISTORY AND TESTIMONY IN THE DIGITAL AGE: STUDYING HOLOCAUST SURVIVORS PANEL 2

Austin Tait, Jackson Schooley, Logan McCall, Madeline Walsh
History, Political Science, and Economics, Oral Presentation
Section: 5, 1:30 PM
Presentation Number: 744
Mentor(s): Steven Weiland (EDUCATIONAL ADMINISTRATION)

Survivors of the Holocaust have provided vivid accounts of their experience. Over 52,000 video and audio testimonies at the USC Shoah Foundation's Visual History Archive document the impact of the Holocaust on Jews and other victims of the Nazis. They help us to answer

these questions: What can be learned about the Holocaust from the perspective of those who survived to tell their stories? What are the best methods for learning from testimony as a form of historical evidence? How can the evidence of testimony best be incorporated into Holocaust research and presented, including the uses of digital resources? We can capitalize on digital resources to complement traditional textual ones in doing research in a domain of inquiry with profound historical and personal meanings. This panel reflects study of Doris Bergen's authoritative War and Genocide and presents examples from the testimony of Holocaust experience in these categories: a) Adolescent life in the Lodz Ghetto; b) Religion in the Lives of Survivors; c) A Non-Jewish Survivor who Opposed the Nazis; and d) Memory of Physical Suffering Among Women.

GRANT AND BANKS: THE GENERALS WHO OPENED THE MISSISSIPPI

Michael Schiestel
History, Political Science, and Economics, Oral Presentation
Section: 5, 1:45 PM
Presentation Number: 745
Mentor(s): John Waller (HISTORY), Peter Knupfer (HISTORY)

Nathaniel P. Banks is often regarded as one of the incompetent "political generals" that hindered Union victory during the Civil War. Meanwhile, Ulysses S. Grant is viewed by many as the premier Federal commander during the conflict. This paper tests to see whether that claim is true by comparing their performances in the Port Hudson and Vicksburg Campaigns that Banks and Grant conducted, respectively, in 1862-63 to open the Mississippi River to the Union. The generals are rated based on their ability to accomplish their orders to link up with the other's army to open the Mississippi to the Union while being as efficient as possible in terms of time and manpower. When looking at Grant and Banks in this light, Grant, while his performance was not flawless, solidifies his status as one of the best generals in the Civil War, yet Banks's performance compares favorably to Grant and he conducted the Port Hudson Campaign in a reasonably competent manner. Therefore, Banks's legacy deserves to be re-evaluated. While he is by no means a brilliant commander, it is just as inaccurate to dismiss him as an incompetent fool.

HISTORY AND TESTIMONY IN THE DIGITAL AGE: STUDYING HOLOCAUST SURVIVORS PANEL 1

Apoorva Dayananda, Jacob Kunka, Michael Gardyko, Sophie Brefka
History, Political Science, and Economics, Oral Presentation
Section: 5, 2:00 PM
Presentation Number: 746
Mentor(s): Amy Simon (JAMES MADISON COLLEGE), Steven Weiland (EDUCATIONAL ADMINISTRATION)

Survivors of the Holocaust have provided vivid accounts of their experience. Over 52,000 video and audio testimonies at the USC Shoah Foundation's Visual History Archive document the impact of the Holocaust on Jews and other victims of the Nazis. They help us to answer these questions: What can be learned about the Holocaust from the perspective of those who survived to tell their stories? What are the best methods for learning from testimony as a form of historical evidence? How can the evidence of testimony best be incorporated into Holocaust research and presented, including the uses of digital resources? We can capitalize on digital resources to complement traditional textual ones in doing research in a domain of inquiry with profound historical and personal meanings. This panel reflects the study of Doris Bergen's authoritative War and Genocide and presents examples from the testimony of Holocaust experience in these categories: a) Children and adolescents who escaped to England via the Kindertransport; b) Women coping with difficulties of childbearing; c) Roles in the Warsaw Uprising; and d) How Shanghai became of destination for Holocaust refugees.

THE SEQUENCE OF PLUNDER: A CASE STUDY OF HOUSING DISPOSSESSION IN DETROIT

Troy Distelrath
History, Political Science, and Economics, Oral Presentation
Section: 5, 2:15 PM
Presentation Number: 747
Mentor(s): Asia Hudson (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH), Matthew Grossmann (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH)

The system of dispossession in the United States, particularly for land and/or housing, is one of the most significant historical methods of accumulation for wealthy whites and of disaccumulation for African Americans and other people of color. Unfortunately, this phenomenon is perhaps best exemplified by Detroit, Michigan due to the devastatingly negative consequences of deindustrialization, white flight, urban decay, and - most recently - the Great Recession. Even as revitalization narratives about the city (particularly downtown) gain traction in the media, Detroit's outer neighborhoods continue to be decimated by the greed of land speculators and parasitic policies written by and for the economically privileged. Consequently, in this presentation I seek a better way forward by: 1.) contextualizing the history of dispossession in Detroit and the United States more broadly, 2.) detailing the deindustrialization of Detroit through the Great Recession, 3.) discussing the effects of factors such as municipal bankruptcy, tax foreclosure, urban renewal, eminent domain, land speculation, and property taxes on dispossession, and 4.) summarizing the sequence of plunder experienced by minority homeowners in the city. To conclude, I put forth several policies designed to empower Detroit residents and bring an end to the city's racialized dispossession crisis.

REPRESENTATIONS OF THE NAUTCH GIRL AND MY ROLE AS A RESEARCH ASSISTANT

Julia Moore
History, Political Science, and Economics, Oral Presentation
Section: 5, 2:30 PM
Presentation Number: 748
Mentor(s): Sitara Thobani (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

The figure of the Indian nautch dancer has long captured imaginations on both sides of the colonial divide. Dr. Sitara Thobani has been studying this seemingly mysterious and exotic figure of the nautch dancer, posing questions that examine the gendered and colonial images that have been portrayed by the figure. As a history student and in my own research, I focus on gendered representations of European women in the second world war. Working with Dr. Thobani, even though her research is outside my geographical area, has helped me develop broader skills in the academic world of Gender Studies. Currently I am helping her develop this project, asking and answering questions such as: How is/has the figure of the Indian nautch dancer been evoked throughout colonial history and what is the effect of that representation in gendered and racial relations? This presentation will focus specifically on my work as Dr. Thobani's assistant this semester, which has included but not limited to gathering materials and building skills I hope to use in my future career and studies.

HUMANITIES

THE PROVENANCE OF RIDER'S (1726) BRITISH MERLIN

Riley Puscas
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 591
Mentor(s): Liam Brockey (HISTORY)

Provenance is defined as, the complete ownership history of a work of literature or object. My research is on the provenance, the past ownership, of the almanac "Rider's (1726) British Merlin". An almanac is a calendar that contains special dates and important information and tips for occupations such as farmers and physicians. To research this, I inspect a multitude of things. For example, inscriptions, names, stamps, the author, or book plates, which is a decorative paper pasted with a person's name and information. Basically, I look at any aspect of the physical state that is unique to this copy. Looking at those pieces, I put together the puzzle that is the trail of owners, and how this book got from the printing press to the MSU library. Through MSU's special collections library I was able to inspect the almanac's physical state and bridge inscriptions and clues to owners and build this almanac's history. I also looked at multiple sources and records to research this almanac's provenance. This type of research is important in piecing together parts of history, major and minor, and the influences history and literature had on each other. The provenance of "Rider's (1726) British Merlin" was difficult to research since almanacs are short-lived and owners don't see a need to record their name as they would in a more important work. My presentation will go into depth the discoveries, and their meanings, I found through my research on provenance.

READING IN REAL TIME: OBSERVING THE EFFECTS OF PRELIMINARY MOOD ON RECEPTION OF POETRY

Isis Elmore-Woods, Jacob Phillips, Mitch Carr, Sami Luke
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 592
Mentor(s): Natalie Phillips (ENGLISH)

The Digital Humanities and Literary Cognition Lab (DHLC) at Michigan State University is conducting an interdisciplinary study of sonnets seeking an explanation to understand the connections between physical and mental states of being and how they impact real-time reading. By analyzing preliminary data, we hope to compare the recollection of the poem and reading experiences. This preliminary data is related to participants' mood (i.e. hours of sleep, how much work done in a day, if they enjoyed reading, etc). For this poetry study, Michigan State undergraduates were tasked with reading sixteen sonnets twice. The purpose of the first reading was to familiarize themselves with the text, and the second for analysis. Participants were then prompted to rate qualities of their reading experience on a 1-10 scale, including how positively or negatively they felt about each poem. Additionally, participants were asked to highlight moments of aesthetic pleasure in green (powerful, pleasurable, moving), and moments of aesthetic displeasure in red. The DHLC expects data to show that participants who had lower quality preliminary data (i.e. lack of sleep, level of exhaustion, or are hungry) had lower quality reading experiences than participants with higher quality preliminary data. The DHLC quantifies quality research experience by the participants' active engagement with the text (how many highlighted segments per sonnet and participation in long answer responses).The DHLC believes understanding the participant's mood prior to reading is important because it will further scholars' understanding of how and why people read the way they do.

PROVENANCE OF AN MORAL ESSAY PRINTED IN 1691

Alex Manning

Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 593
Mentor(s): Liam Brockey (HISTORY)

MSU Special Collections is home to many old texts, each text with its own story. Regarding a collection, provenance is the record of ownership for each object specifically. In UGS 200H each student was provided a book that had no history. The goal being to piece together an understanding of who owned this book and why. In this presentation the book whose provenance is being examined is Autarchy or The Art of Self Government. We examined these books carefully for telltale signs and signatures that could lead us to the original owners of these works. When working with an object that is so old, many times the book will have changed hands repeatedly before eventually coming into our possession at MSU. With this research we were able to track down previous owners of the book, where they lived, and what time period they would have owned it. Connecting the details surrounding their lives to the book itself we can determine why the previous owners would buy such a book at a time when they were not cheap investments.

NKRUMAH AND HIS CONSCIENCISM

Daquavion Holmes

Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 594
Mentor(s): John McClendon (PHILOSOPHY)

Assisting with the development of manuscript for a book published on Kwame Nkrumah's and his Consciencism and showing its impact and use amongst the African Diaspora and society itself.

THE PROVENANCE OF THE STAGGERING STATE OF THE SCOTS STATESMAN

Gabrielle Grace

Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 595
Mentor(s): Liam Brockey (HISTORY)

I researched the provenance of MSU library's copy of The Staggering State of the Scots Statesman by Sir John Scot. Provenance is the history of ownership of a book from its printing to its current location. In my case, this history of ownership refers to a trail of different people or groups who have owned the specific copy of Scot's book that is now owned by MSU Library. Some important aspects of provenance include the physical state of the text, annotations and markings in the text, previous owners of the text, bookplates, printers, publishers, the author, and the content of the book. In researching the provenance of this book, I aim to discover connections between the previous owners of the book and the content in the book. My research was done by exploring different sources in order to find information about the various aspects of provenance. The goal of exploring these sources is to collect enough puzzle pieces to create a full picture of the history of the text. This research is important because it allows us to discover the historical impact on books as well as the influence of books on the events of history. Observing people's direct reactions to a text can provide information on the history and the social context when the book was published. I will present on my findings of the full provenance of this text and what these findings mean in terms of history.

AN OBSERVATIONAL STUDY BETWEEN HOURS OF SLEEP AND RECOLLECTION OF POETRY

Akanksha Kapur
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 596
Mentor(s): Natalie Phillips (ENGLISH)

The Digital Humanities and Literary Cognition Lab (DHLC) at Michigan State University is conducting an interdisciplinary study on sonnets, seeking an explanation to understand the correlations between states of well-being and their impact upon real-time reading. By analyzing pre and post survey questions which gathered information about participants' well-being (how stressed they felt, how many hours of sleep they had, etc.) from an ongoing poetry study, we are looking for connections between well-being of readers and how reading in real-time is perceived. Michigan State undergraduates were asked to read sixteen sonnets twice (first for familiarization and second for analysis). Participants rated qualities of their reading experience on a scale from 1-10, including how positively or negatively they felt about each poem. Additionally, participants were asked to highlight moments of aesthetic pleasure in green (powerful, moving, etc.), and aesthetic displeasure in red. Once participants had read the poems for a second time, they were asked a series of questions about each poem (Do you recollect the poem? What did you find pleasing? etc.). I hypothesize data to show that participants with less hours of sleep will have fewer recollection of the poems. Recollection is quantified by the percentage of the poems participants were able to recall. Understanding the effect of sleep on recollection of text is important as it impacts students' quality of learning. This poster will enrich a fellow poster "Reading in Real Time: Observing the Effects of Preliminary Mood on Reception of Poetry" by placing an emphasis upon memory.

PERCEPTIONS OF WAR IN CLASSICAL MUSIC ACROSS CULTURES

Sarah Geist, Talia Cohen
Humanities, Poster Presentation
Section: 1, 3:00 - 4:30 PM
Presentation Number: 597
Mentor(s): Natalie Phillips (ENGLISH)

This research aims to examine and reveal cultural differences that may exist between communities in the way that they hear and perceive music. In this study that we conducted, participants belonging to three different locational communities (the University of Arkansas, MSU, and China) listened to 8 one-minute long classical music excerpts, four of which were Western and four of which were Chinese, out of a total corpus of 32 excerpts. The participants were then asked to indicate whether they heard some type of story attached to each given excerpt, and if so, were asked to write down the narratives or story elements that they imagined or "heard" while listening to the piece. After the data was collected and compiled, a group of three researchers read through all the narratives written for each excerpt and subjectively identified common themes that appeared across multiple narratives in response to a single excerpt. While analyzing the data, the extracted themes were separated according to the excerpt and the location of listeners. We identified 10 excerpts (3 Chinese and 7 Western) containing common themes related to war across the narratives generated by at least one source of listeners. This specific study analyzes how Western (University of Arkansas and MSU) and Chinese listeners perceive war and related themes in classical music originating from their own culture and from another culture, with the goal of revealing cultural differences in perceptions of war and its connection to music.

SIGNED VITA AND VIRGINIA: QUEER COMMUNICATION IN THE EARLY 20TH CENTURY

Ashley Highland

Humanities, Oral Presentation
Section: 2, 9:00 AM
Presentation Number: 935
Mentor(s): Alice Lynn McMichael (HISTORY)

Popular culture often depicts the pre-Stonewall era as a period without queer people, and certainly without open communication between them. Yet, we know people of varying sexual preferences and identities existed and formed relationships. Authors Virginia Woolf and Vita Sackville-West are more often known for their literary merits. Their relationship is one that many historians categorize as an "intimate friendship." However, my work seeks to understand them as a historical example of the way that queer people used written personal communications as a means of intimacy and resistence. In my research, I digitized and reviewed a large collection of letters between the two women. I used digital tools to analyze the text to find themes and patterns, identifying key features in the writing. After this "distant reading" technique I did a targeted close reading. In my presentation, I'll discuss the combination of the two approaches and how they ultimately revealed a trend toward intimate language and writing styles. To close, I will explore why I believe that their relationship both follows and expands beyond the "intimate friendship" narrative of previous scholars, into an explicitly romantic and sexual experience.

ALTERNATIVE HISTORY: HOW FEMINIST NARRATIVES USE MEMORY TO QUEER HISTORY

Aileen Dwyer

Humanities, Oral Presentation
Section: 2, 9:15 AM
Presentation Number: 936
Mentor(s): Nicole McCleese (ENGLISH)

This presentation is an examination of the term "alternative history" and how authors use the perspective and memories of queer characters to remove heteronormative, patriarchal social structures and create new environments open to new ideas about race, gender, and sexuality. Alternative history, when used in the realms of postmodern and queer studies, is when history is told from an unusual or unorthodox perspective. By using the memories of queer women to construct an audience's understanding of history, narratives can begin to dismantle and reconstruct our understanding of our present world and the different powers within it. This presentation highlights the novel Fledgling by Octavia Butler, the short story "Inventory" from Carmen Maria Machado's collection Her Body and Other Parties, and the video game Gone Home.

ODE TO THE DAMNÉD: THE BLACKS ARTS MOVEMENT AND DECOLONIAL AESTHETICS

Triniti Watson

Humanities, Oral Presentation
Section: 2, 9:30 AM
Presentation Number: 937
Mentor(s): Rashida Harrison (JAMES MADISON COLLEGE)

This paper holds the intention of speaking on the spatial and philosophic depths of the Black Arts Movement through a Black Feminist lens and aims to reveal how art as a mode of expression is an envisioned practice that aims to recreate Black subjectivity. I plan to do this by first defining creativity as a mode of self-transformation through consciousness and feeling, and I plan to highlight how its embodiment in Black artistry reveals its power in reshaping subjectivity over time and space. Such revelation will be proven through utilizing work from both Black Feminist writers and prominent Black artists from the Black Arts

Movement to define the process of recapturing the self through artistic storytelling and the practice of speaking. A Black Feminist-Futurist lens is necessary for addressing the purpose of Black art as such praxis has historically understood and utilized the tool of creativity to retell hidden stories of Black existence through language. By speaking on the affective process that is placed within art, I hope to reveal how creativity is tied to one's becoming in life which thus declares the futurity of how they can exist and what they exist for.

EL MOVIMIENTO: REFLECTING ON THE CHICANO CIVIL RIGHTS MOVEMENT

Alyssa Briones

Humanities, Oral Presentation
Section: 2, 9:45 AM
Presentation Number: 938
Mentor(s): Kevin Brooks (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

During the 1960's, there was a call for change throughout America. People of color were at their peak of fighting discrimination, creating movements to reinforce their beliefs and needs. While all people of color were facing social injustices, the Latinx community wanted to address the issues of farmworker rights, land restoration, and better political education among Latinx's. The Chicano Civil Rights Movement took place throughout the sixties and seventies, around this time, there weren't many rights reserved for the ethnic population. Because of the movement, there was a significant amount of social change with affects lasting today. After addressing such issues, more Latinx friendly and Latinx oriented organizations were created. Organizations like these were led by influential activists such as Reies Lopez Tijerina, Cesar E. Chavez and Dolores Huerta, and Jose Angel Gutierrez. While these organizations had a lasting impact on the Latinx community, the idea of Chicanismo has gone farther than imagined. The ideation of being proud of your heritage was the "secret weapon" of the movement itself. This paper reflects on the Chicano Civil Rights Movement and the events that followed. One of the central arguments is the motivation for fair access to land.

CREATING MEANINGFUL RELATIONSHIPS BETWEEN GENERATIONS OF EDUCATED LATINAS: STUDYING THE EFFECTS OF MENTORSHIP ON LATINA HIGH SCHOOL YOUTH

Onostee Morell

Humanities, Oral Presentation
Section: 3, 11:00 AM
Presentation Number: 941
Mentor(s): Estrella Torrez (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

Through interviews and sharing experiences about our shared interactions, I will analyze ow mentoring interactions affect how the young Latinas involved in this project pursue ducation and involvement in community engagement. To support this goal, I will also note and share what techniques prove to be most effective in building bonds between the members of this project and what kinds of inspiration come from these techniques, with the goal of offering suggestions for future mentorship models for Latinas in educational settings. Because of my work with Dr. Torrez in the Lansing School District with Latinx youth I have the opportunity to analyze the effects of mentorship with Latina high schoolers. For this project, I will be working with Latinas aged between 14-18, as they navigate high school and early college admissions. Mentorship for these youth comes from many Latinas with varying levels of higher education (undergrad, graduate, professors) when we meet on a weekly basis in their Latino Leadership Club and during our community engagement trip to Puerto Rico over spring break. I hope to highlight the importance of creating meaningful relationships between generations of educated Latinas and the opportunity Latinas have to give back to the communities we come from by encouraging the next generation to pursue higher education themselves.

THE HUMANITIES BUSINESS: AN INSIDER'S LOOK AT THE WORLD OF PUBLISHING AND PROFESSIONAL WRITING

Lydia Barron
Humanities, Oral Presentation
Section: 3, 11:15 AM
Presentation Number: 942
Mentor(s): Anita Skeen (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

Some people will tell you that Toni Morrison was the last great American writer. But why can't that be you, or me? And who will be in the next generation of great American writers? Since entering university as an amateur writer my qualitative research has focused on the world of professional writing and the business side of humanities programs at both graduate and undergraduate levels. This research has helped me understand and develop marketing practices for the RCAH Center for Poetry's Wheelbarrow Books Poetry Competition, apply these understandings to my own work, and bridge the personal and professional through attending the Associated Writing Programs Conference in 2020. Some special aspects of this talk will include tracing my own path as a writer, discussing the value of professional organizations, and looking at the future of humanities programs and contemporary literature.

#OWNVOICES: HOW A HASHTAG INFLUENCES D&I IN YA LITERATURE

Sophie Schmidt
Humanities, Oral Presentation
Section: 3, 11:30 AM
Presentation Number: 943
Mentor(s): Kate Birdsall (WRITING, RHETORIC, AND AMERICAN CULTURE)

Representation in literature is not a new discussion in the publishing industry. It is only as of the past decade or so with the aid of social media platforms and the rapid advancement of technology that this conversation is able to be held by several stakeholders within publishing, including readers themselves. #WeNeedDiverseBooks is a hashtag on Twitter that was created in 2014 in response to "an all-white, all-male panel of children's book authors at a 2014 BookCon reader event." At the time, BookCon organizers put together a last-minute panel focusing on the movement, and it included authors of color Grace Lin, Matt de la Peña, and Jacquline Woodson. #OwnVoices is another hashtag that began trending in 2015 after yet another conversation about marginalized voices or lack thereof in publishing. It was coined by author Corinne Duyvis after a conversation about how there was a lack of stories written by and for people of marginalized identities that features characters of those identities. Originally, the conversation centered around children's literature, but the hashtag has since been applied to books belonging to all age groups. This presentation focuses on research conducted by tracking the different hashtags (#OwnVoices, #WeNeedDiverseBooks, and #WNDB) and examining how these conversations promote the diversity and inclusion within Young Adult literature. It's clear from preliminary research that these conversations center around up and coming novels.

VERB ASPECT IN MUSIC DRIVEN NARRATIVE VOICE

Eiryn Hodges
Humanities, Oral Presentation
Section: 3, 11:45 AM
Presentation Number: 944
Mentor(s): Natalie Phillips (ENGLISH)

The Music and Narrative study is conducted by the Digital Humanities and Literary Cognition (DHLC) and Timing, Attention, and Perception (TAP) Labs at Michigan State University, in partnership with the University of Arkansas. 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, if any stories or elements of a story they heard while listening. Many people heard narrative stories, but even more interesting, is the overlap of elements within these stories. There are three participant groups, one from the University of Arkansas, one from Michigan State University, and the third from a rural city in China, called Dimen. Then, organized by participant group, and by music excerpt, we isolated the verbs and verb aspect (specifically progressives) and tense, in each narrative. The results were significantly to the favor of progressive aspect. This allows for exploration of the temporal sense that people have when they are listening to music, and the nature of the stories they hear within.

PREACHERS, PORTRAITS, AND SHAKESPEARE: AN INVESTIGATION OF THE PROVENANCE OF THE SCHOOLEMASTER BY ROGER ASCHAM

Mary Claire Zauel
Humanities, Oral Presentation
Section: 3, 12:00 PM
Presentation Number: 945
Mentor(s): Liam Brockey (HISTORY)

The Schoolemaster, the revolutionary work by Roger Ascham, expanded the field of education by proposing compassionate teaching methods that were in sharp contrast to the current disciplinary practices. First published in 1570 and written for wealthy households in England, Ascham's book has influenced the principles of teaching for centuries and his once-radical ideas are now universally accepted. Michigan State University's copy of The Schoolemaster, published in 1589, is an extraordinary example of provenance and the fascinating connections it can reveal. Provenance is the study of the ownership of a specific book, and involves analyzing and researching the evidence found in the work to reconstruct its chain of custody. This evidence includes signatures, notes, or just a pencil mark on a page, and requires extensive investigative research to discover its origin. The Schoolemaster contained substantial evidence of ownership, making it an ideal source for provenance research. With owners such as Immanuel Bourne, a 16th century divine; the father of Joshua Reynolds, the world-famous painter; and John Lawson, a prominent English bookseller; the provenance of this book was full of unexpected discoveries as it traveled from London to the Michigan State University library. Beyond its many owners, this copy of The Schoolemaster has intrigued several Shakespearean scholars due to the possibility that it was used to teach young William Shakespeare himself. The study of provenance through investigative research proves that every book tells a story beyond what is written in its pages, and The Schoolemaster is no exception.

HISTORY FROM A PRINTED BOOK'S PERSPECTIVE

Han Nguyen
Humanities, Oral Presentation
Section: 4, 3:30 PM
Presentation Number: 954
Mentor(s): Liam Brockey (HISTORY)

Before industrialization, books were crafted by many hands of the masters in the book industry. Therefore, except for the elites and royals, books became precious objects to their owners, resulting in proactive engagement with the texts as a way of embracing the books. Unlike modern people, people in the past actively expressed their thoughts through notes on pages, and this gave birth to an area called provenance in the field of book history. Provenance research traces the ownership of a book and attempts to construct a timeline using both physical and contextual information from the book. This research focuses on the provenance of the book "The Husband-Mans Practice or; prognostication for ever. As teachers Albert, Alkind, Haly, and Petolomy. With the Shepherds perpetual Prognostication

for the Weather." Through examining the handwriting and marks of ownership in the book and the physical appearance of the book, I will make a connection between the use of this book and the values of printed books in general. Even though the book employs geocentrism, a belief that the universe revolves around the Earth, some of its later owners lived in the 19th, 20th, and even 21st century. What makes this book attractive to modern men? What stories does it tell about the fall of geocentrism? What does it convey about the stances of printed books in the technological time? This worn-out book can answers these questions, asserting a powerful claim about the preservation of old books.

ALICE WALKER'S THE COLOR PURPLE: A CULTURAL ARTIFACT

Jamia Henry
Humanities, Oral Presentation
Section: 4, 3:45 PM
Presentation Number: 955
Mentor(s): Kevin Brooks (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

There are certain lessons we learn in life from the neighborhoods we live in, the families we come from, the movies we watch and more. Because of that, we cling to them in hopes of passing those lessons down from generation to generation. The Color Purple, a novel written by Alice Walker and later made into a movie starring Whoopi Goldberg and Oprah Winfrey, is essential to African American culture. What is prominent about cultural artifacts, is their presence almost always relate to every member of the community. This presentation examines how artifacts can shape cultures, bring together communities, and construct lessons and stories in a powerful way.

PURPOSE AND LOVE AS INSTRUMENTS FOR OVERCOMING ADVERSITY

Kianna Delly, Kyle Whitehouse, Sarata Seydi
Humanities, Oral Presentation
Section: 4, 4:00 PM
Presentation Number: 956
Mentor(s): Kevin Brooks (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

Purpose and adversity go hand in hand. If you have purpose and goals in life, there is going to be adversity along the way. For me, racism has been one of the primary adversities affecting me for a long time that I had to overcome. Young black children are growing up and seeing numerous acts of racism. But, spreading love and acceptance is something that has helped me despite the hate that I see every day on social media, the news, and in my interactions. Love and acceptance and spreading that message is one of my purposes in life. In this presentation, I will discuss how my experience volunteering at a local elementary school, using activities on purpose, and facilitating conversations about love as a method to overcome adversity assisted with increasing my understanding of civic engagement.

NONHUMAN SUBJECTIVITY, SCIENCE FICTION, AND CONSENT

Tabitha Zivku
Humanities, Oral Presentation
Section: 4, 4:15 PM
Presentation Number: 957
Mentor(s): Nicole McCleese (ENGLISH)

How can recent research on teaching empathy using fictional androids, inform non-human consent in science fiction by revisiting postmodern subjectivity? My project builds on research in "Locating Empathy: Using Android Protagonists to Teach Oppression and Marginalization", by Emily Hall. In her article, Hall discusses her pedagogical technique of using cyborgs in literature to discuss oppression, marginalization, and consent. Hall writes, "... literary depictions of androids create a space for authors to critique the treatment of

particular populations through nonhuman characters" (552). I extend Hall's argument about the consent of cyborgs in literary depictions of androids to the consent of cyborgs in postmodern science fiction novels and use these as a gateway to discuss consent. The two postmodern science fiction novels, The Female Man and Neuromancer, will be used to discuss cyborgs and consent.

INTEGRATIVE BIOLOGY & ORGANISMAL BIOLOGY

JUVENILE SOCIAL PLAY AND ADULT SOCIAL BONDS IN SPOTTED HYENAS

Hanna Burton

Integrative Biology and Organismal Biology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 330
Mentor(s): Kay Holekamp (INTEGRATIVE BIOLOGY), Tracy Montgomery (INTEGRATIVE BIOLOGY)

Social play has been recognized as preparation for adulthood. Many animals across taxa engage in play behavior, especially those with prolonged juvenile periods and parental care. It is hypothesized that play enhances social skills, strengthens social bonds, reduces aggression and more. The spotted hyena, Crocuta crocuta, is a model organism in which to test this hypothesis due to their complex societies characterized by fission-fusion dynamics. Social bonds are important to fitness, as hyenas who are more social enjoy greater longevity, which is positively correlated with reproductive success. Here, we hypothesize that juvenile social play enhances adult social skills. We predict that individuals who played more as cubs should be involved in more greeting ceremonies in adulthood. Greetings are important affiliative displays that are used to reconcile fights, signal acknowledgement of dominance status, and reduce tension among individuals. For this analysis, we leveraged the long-term dataset of the Mara Hyena Project (MHP). MHP performed focal animal sampling on hyena cubs from 1988 to 2003, from which we extracted detailed data on social play. MHP also recorded greeting behavior via all-occurrence sampling during and after this time period; a greet was recognized as two or more hyenas lifting legs to expose their phalluses for each other to sniff. We hope that this study will elucidate the effect of social play on adult sociality in a gregarious, long-lived carnivore.

EFFECTS OF HYPERGLYCEMIA ON CAROTID BODY HYPOXIC RESPONSES

Nour Dahech

Integrative Biology and Organismal Biology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 331
Mentor(s): Erica Wehrwein (PHYSIOLOGY)

Carotid body chemoreceptors respond to a variety of metabolic changes in an integrative manner. Given that hyperglycemia can serve as a desensitizer of the carotid bodies, we hypothesized hyperglycemia would blunt the carotid body's ability to increase heart rate, blood pressure, and ventilation in response to hypoxia. Thirteen young healthy subjects (7M, 6F) were studied after fasting for at least three hours. Change in heart rate, blood pressure, and ventilation was measured between normoxic and hypoxic breathing conditions during fasting euglycemia (average blood glucose 89.77±3.44 mg/dL) and again 30 minutes after administration of 75g oral glucose tolerance test to induce hyperglycemia (average blood glucose 149.92±9.72 mg/dL). Statistical analysis was done using paired t-tests. Comparisons were made between fasting and hyperglycemia for each characteristic measured and are reported as the delta change from normoxia to hypoxia: systolic blood pressure (7.23±1.44 vs 1.38±1.73 mmHg, $p<0.05$), mean arterial pressure (5.18±1.04 vs 1.79±1.42 mmHg, $p<0.05$), heart

rate (8.24±1.80 vs 3.93±1.59 beats/min, p<0.05), and respiration (1.57±0.86 vs 0.02±0.41 breaths/min, p<0.05). This data shows that hyperglycemia blunts physiological responses to hypoxia, likely through desensitization of the carotid body. Thus, this study supports the role for the carotid body as an important integrative physiological sensor.

ANNUAL KILLIFISH EXPRESS HATCHING ENZYME GENE DURING DIAPAUSE 3

Harrison Wojtas

Integrative Biology and Organismal Biology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 332
Mentor(s): Andrew Thompson (INTEGRATIVE BIOLOGY), Ingo Braasch (INTEGRATIVE BIOLOGY)

All animals develop as embryos inside eggs and must go through hatching. Embryos hatch by producing choriolytic enzymes, which are enzymes that digest the proteins that make up the chorion, an envelope that protects the embryo from the environment. The Rio Pearlfish (Nematolebias whitei) is found in the Rio de Janeiro State of Brazil and is an annual killifish. Annual fish spend their adult life in seasonal freshwater pools that periodically dry up, killing the adults. Before the dry season, killifish spawn their eggs in the mud, and the embryos can tolerate long periods of desiccation and hatch during the wet season. During the dry seasons, the embryos stay in three stages of diapause, which is a period of suspended development or dormancy, and require environmental cues to trigger development and hatching after the 3rd diapause stage. Water is an important environmental cue that signals the killifish embryo to produce or release choriolytic enzymes allowing for the embryo to hatch and develop into an adult. We have identified two types of choriolytic enzyme genes in the Rio Pearlfish; a high choriolytic enzyme (hce), and a low choriolytic enzyme (lce). We performed an in-situ hybridization of diapause III Rio Pearlfish embryos to locate where lce genes are expressed during development. The lce genes are expressed in the pharyngeal and the buccal cavities. By understanding the temporal and spatial expression of lce genes during development, we can better understand how environmental triggers induce hatching.

ESTIMATING ELECTRIC SIGNAL PREFERENCE IN PARAMORMYROPS KINSGLEYAE

Douglas Maldonado-Torres, Emily Parker, Kristen Lounsbury

Integrative Biology and Organismal Biology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 333
Mentor(s): Sophie Picq (INTEGRATIVE BIOLOGY)

Species of weakly electric fish demonstrate the ability to communicate with each other and interact with their environment by emitting electric organ discharges (EODs). A particular species in Gabon, Africa - Paramormyrops kingsleyae - exhibits remarkable variation in its signal: populations of P. kingsleyae have either biphasic or triphasic EODs. A previous study has shown that P. kingselyae can discriminate between both EOD types. In order to identify the driving factor behind this polymorphism we conducted a field paired playback of EODs recorded from biphasic vs triphasic individuals. By analyzing certain behaviors - such as time spent close to the playback electrodes, headbutting, circling the electrode, and tail probing near the electrode - we were able to determine what signal type P. kingsleyae preferentially associate with. This study explores the behavioral preference for local vs. foreign EODs in P. kingsleyae, which will provide insight on the role that EODs play in driving evolutionary diversity among the species rich African weakly electric fish.

INVESTIGATING BEARDED DRAGON SKIN WITH AN SEM

Anthony Schulte

Integrative Biology and Organismal Biology, Poster Presentation

Section: 1, 11:00 - 12:30 PM
Presentation Number: 334
Mentor(s): Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Over 280 million years ago, the ancestors of reptiles moved from water to land, which was only made possible by certain adaptations that they acquired. But what were these adaptations and why were they and still are so effective at letting them survive on land? One adaptation evolved by reptiles is their skin, which has allowed them to survive on land, despite the challenges of their environments. This project strives to examine a bearded dragon's shedded skin using a Scanning Electron Microscope (SEM) and Energy Dispersive Spectroscopy (EDS) to understand how the microstructure and composition of reptile skin are effective at allowing reptiles to survive in the environment that they do. While conducting the research, the SEM and EDS revealed that reptiles have small scales and tough skin with a layer of keratin that have allowed them to survive in arid climates by helping to limit water loss.

INVESTIGATING THE EFFECT OF GLUCOCORTICOIDS ON EXPRESSION OF GENES LINKED TO INTESTINAL CALCIUM ABSORPTION

Soumya Chennupati
Integrative Biology and Organismal Biology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 335
Mentor(s): Laura McCabe (PHYSIOLOGY), Narayanan Parameswaran (HUMAN MEDICINE)

Intestinal calcium absorption is an important physiological process because calcium is an important component of the bone mineralized matrix. When calcium absorption is low, bone synthesis and density is significantly reduced. Several genes play a role in intestinal calcium absorption including calcium binding proteins (CaBP9k, CaBP28k) and channels (TRPV5, TRPV6). Glucocorticoids (GC) are widely used for preventing/treating inflammatory disease but can cause osteoporosis and an imbalance in the intestinal microbiota composition (dysbiosis). My research goal is to understand the effect of chronic GC treatment with or without microbiota modulation (by treating with the probiotic Lactobacillus reuteri 6475 (LR) or a high molecular weight polymer (MDY)) on the expression of genes related to intestinal calcium absorption. Male C57BL/6J (16-weeks-old) mice were treated for 8-weeks with GC (subcutaneous slow release pellet) and supplemented with or without 3.3x108 cfu/ml LR and 1.25% MDY in their drinking water. Subsequently, RNA is extracted and analyzed from frozen small and large intestinal segments. Preliminary RT-qPCR results suggest that chronic GC treatment does not have significant effects on the mRNA levels of calcium related genes. My future studies will include more tissue samples per group and will examine treatment effects on levels of inflammation related factors. A better understanding of the role of glucocorticoids in regulating various calcium absorption and inflammatory genes throughout the gut-bone signaling pathway could lead to the development of supplements that help optimize the process and prevent osteoporosis.

GENETIC VALIDATION OF CHARACTERIZING THE DIET OF FRUGIVOROUS BIRDS DURING MIGRATION

Zack Spodek
Integrative Biology and Organismal Biology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 336
Mentor(s): Jennifer Owen (FISHERIES & WILDLIFE)

Migratory land birds travel long distances between their breeding and wintering grounds, which creates a necessity for the birds to consume enough energy to sustain flight and maintenance functions. It is therefore essential that there is an abundance of nutritious plant

species at the many stopover sites that the birds visit along their journey. The present study was conducted in 2019 at two fall migration banding stations in Bath, Michigan. During past banding seasons, fecal samples from focal migratory species have been collected on pieces of paper that retain the color of the samples. These paper samples have been used to predict what fruit species the birds have consumed. The objective of the current research was to conduct genetic analysis of the different colored fecal samples and determine if there is a relationship between fecal color and specific plant species. Twenty-six fecal samples were collected on Whatman cardstock from avian species including the American Robin, Gray Catbird, Swainson's Thrush, Hermit Thrush, Wood Thrush and Gray-Cheeked Thrush. DNA was extracted from each sample and the rbcL chloroplast gene was amplified via PCR. Thirty-two sequences were generated by Sanger sequencing at the Research Technology Support Facility. Using the BLAST tool on the NCBI database, it was found that DNA from several of the fecal samples matched single-taxa sequences of plant species at the study site. However, many of the samples may have contained DNA from multiple plant species, which may present complications for single-taxon predictions based on fecal color.

INVASIVE PLANTS HAVE SOME ADVANTAGES OVER NATIVE PLANTS IN THE STANFORD NATURAL AREA

Madeline Dawson, Sameera Mahimkar, Sophie Poterala
Integrative Biology and Organismal Biology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 337
Mentor(s): Corrine Higley (BIOLOGICAL SCIENCE PROGRAM)

Invasive species are known to have higher photosynthesis rates and faster growth rates than native species. They also produce offspring more rapidly, and can exist across a wide range of environmental conditions. As a result of these factors, invasive species contribute to a decline in native species and biodiversity. The photosynQ device allows us to test different chemical and physiological variables that may lead to photosynthetic advantages. We investigated possible differences in the efficiency of photosystem two, chlorophyll content, and wasted energy from heat in the invasive Prunus serotina and native Lonerica japonica. To assess this, we measured all of the variables on native Prunus and invasive Lonicera regularly throughout the fall season. We determined that invasive L. japonica had a significantly higher chlorophyll content than native P. serotina. There was no significant difference for Phi2 and PhiNPQ levels between the native and invasive species. This suggests that higher chlorophyll levels may be one factor that allows invasive species to have a negative impact on the ecosystems they invade.

TAPHONOMY OF TULLY MONSTER (PENNSYLVANIAN PERIOD, NORTHERN ILLINOIS)

Sara Snyder
Integrative Biology and Organismal Biology, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 517
Mentor(s): Danita Brandt (EARTH AND ENVIRONMENTAL SCIENCES)

Tully monster, Tullimonstrum gregarium, was a strange looking animal preserved in ironstone concretions formed 300 million years ago, part of the Mazon Creek fauna found in northern Illinois. Tully monster is about 12-18 centimeters long and has a narrow, flexible proboscis with a toothed claw. It also has a dorsal eye bar oriented perpendicular to the body, immediately posterior to the proboscis. Recent research suggests that Tully may be an early lamprey-like vertebrate. The purpose of my research is to use taphonomic data, that is, looking for patterns in preservation that might tell us how the animal lived or died. I started with the hypothesis that a recurring taphonomic pattern would help determine whether the animal was alive or dead at the time of burial and preservation. I examined 2,373 photos of Tully

monster from an online database from the Field Museum of Natural History (Chicago). Of these, 83 specimens were used in my analysis. I categorized the fossils based on bodyline, shape of the proboscis, orientation of the eyebar relative to the body, and preservation state (well-preserved or poorly preserved). The data show a slight positive relationship between bodyline and proboscis orientation, for example, straight bodylines are associated with straight proboscis orientation, curved bodylines are more often associated with curved proboscis. There was no clear correlation between preservation type and bodyline or proboscis orientation, and no clear preferred bodyline orientation; about half the specimens had straight body lines, half were curved or folded.

USING A SPLIT-POT SYSTEM TO STUDY LOCALIZED VS. DYNAMIC ROOT RESPONSES IN SWITCHGRASS (PANICUM VIRGATUM)

Hope Meyers
Integrative Biology and Organismal Biology, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 518
Mentor(s): Sarah Evans (KELLOGG BIOLOGICAL STATION), Tayler Chicoine (KELLOGG BIOLOGICAL STATION)

Dynamic communication networks in plants contribute to root plasticity. A perceptible change in the plant's environment such as water shortage, nutrient deficiency or presence of a plant neighbor calls for the mechanism of root plasticity to positively act upon these challenges. Root morphologies are highly dynamic and can be impacted by nitrogen availability, soil moisture content as well as plant neighbors. One of the most frequently-studied plant traits is Specific Root Length, a ratio of total root length to total root biomass. Specific root length may be high in times of N-limiting stress causing plants to invest energy toward the growth of many long, thin roots with a greater surface area for nutrient uptake. In the presence of a plant neighbor, plants often find themselves in competition for water and nutrients, leading to a similar response. Likewise, differences in root morphology may contribute to differences in plant communication by volatile organic compounds and root exudates leading to implications for microbial communities and their respective activities in the rhizosphere. Through the creation of a split-pot system studied under variable nitrogen, water and plant neighbor regimes, it is my hope to learn why roots of Panicum virgatum differ in morphology and whether their roots experience a net systemic or localized response across treatments. The results of this study may or may not implicate possible future analyses of whether root traits (morphology) among different treatments impact microbial community composition and/or extracellular enzyme activities at the level of the rhizosphere.

THE SUPERIOR COLLICULUS OF RODENTS THAT OCCUPY DIFFERENT TEMPORAL NICHES

Peter Zakaria
Integrative Biology and Organismal Biology, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 519
Mentor(s): Barbara Lundrigan (INTEGRATIVE BIOLOGY), Laura Smale (PSYCHOLOGY)

Visual and olfactory structures in the brain must work to provide an individual with context regarding its surroundings. The sizes of these structures relative to the brain are representative of their importance to survival. The superior colliculus is a particularly important structure in rodent brains. Located in the midbrain, it is crucial to the control of eye and whisker movements. The purpose of this study is to compare the superior colliculi and olfactory bulbs in multiple individuals from several species of rodent. The volumes of the superior colliculi and weights of olfactory bulbs were corrected for the weight of the individual and overall brain size, to allow for better comparison between the species. In order

to calculate the volume of the superior colliculus, the brains were cut into thin slices mounted on slides and then stained. The slides were then photographed using a (light) microscope and observed digitally one at a time, marking the area of two sub-regions of the superior colliculus in each section. The areas were then used to calculate the volume of each structure. The relative sizes of the superior colliculi in each species were studied in reference to that species' temporal niche. Diurnal, nocturnal, and flexible species of rodents were all examined. This is to determine if there is a linkage between the relative sizes of these brain structures and the conditions in which an individual has evolved to be active. Preliminary findings suggest that diurnal species have the largest superior colliculi. Data collection is ongoing.

A COMPARISON OF THE SUPERIOR COLLICULUS AMONG VARIOUS SPECIES OF THE ORDER RODENTIA

Courtney McKown
Integrative Biology and Organismal Biology, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 520
Mentor(s): Barbara Lundrigan (INTEGRATIVE BIOLOGY), Laura Smale (PSYCHOLOGY)

The evolution of different behavioral patterns in rodent species has resulted in varying sizes and shapes of different somatosensory structures in the brain. One such structure is the superior colliculus (SC), which is a multi-layered sensory organ, responsible for receiving and processing visual and somatosensory inputs from the facial region. Of the 7 layers in the SC, the intermediate layers, the stratum griseum intermedium (SGI) and the stratum album intermedium (SAI), and the deep layers, the stratum griseum profundum (SGP) and the stratum album profundum (SAP) are responsible for producing outputs to the thalamus and pulvinar, subsequently aiding in eye and whisker movement, and head orientation.The combined volumes of the SGI, SAI, SGP, and SAP structures in multiple rodent species were studied to determine if one behavioral pattern (diurnal) correlates with larger, more developed intermediate and deep layers of the SC than the other (nocturnal). Using the Cavalieri Estimator in Stereoinvestigator, the approximate volumes of the target SC layers were collected and compared among species, relative to brain weight. When comparing the results from two rat species and two squirrel species, the nocturnal species from each pair had the larger deep and intermediate layers of the SC.

THE CLINICAL SIGNIFICANCE OF HEMORRHAGE AND CONGESTION IN THE UTERUS OF MEXICAN WOLVES

Heather Sayles
Integrative Biology and Organismal Biology, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 521
Mentor(s): Dalen Agnew (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

Mexican wolves are carefully monitored and their reproduction controlled because of their endangered status. The genetic variability in this species is low due to inbreeding, which lowers their reproductive success and overall population health. To better understand the reproductive issues plaguing this species, uteri and ovaries from Mexican wolves after death or elective sterilization were evaluated grossly and microscopically in order to identify abnormalities. Vascular changes such as vasodilation and hemorrhage in the uteri and ovaries were common and several criteria were then examined in greater detail using digital image analysis. We hypothesized that increased blood flow and hemorrhage were associated with the stage of the estrous cycle. The degree of vasodilation was scored based on the surface area of the blood vessels in microscopic sections. Other parameters recorded include presence and location of hemorrhaging and stage of the estrous cycle (based on ovarian structures). Comparisons were made between canid uteri with and without vasodilation or

hemorrhaging to identify other possible correlations with age, parity, and cause of surgery or death. By understanding the role and possible causes of vasodilation and hemorrhaging in Mexican wolves' reproductive tracts, we can determine the significance of this finding in poorly reproducing animals in the Mexican wolf population.

EFFECT OF CAFFEINE AND COLD TEMPERATURE ON NERVE CONDUCTION VELOCITY

Ryan Dodds, Syed Feeroz
Integrative Biology and Organismal Biology, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 522
Mentor(s): Erica Wehrwein (PHYSIOLOGY)

Nerve conduction studies are widely used to test for neuropathies and conduction disorders. Previous studies have shown effects on many electrophysiological tests, including those measuring nerve conduction velocity, after caffeine intake and exposure to colder temperatures, that may result in erroneous baseline data. The purpose of this study is to determine the extent to which caffeine and cold temperatures modify nerve conduction velocity. Male subjects with no previously diagnosed conduction disorder(N=10, ages 18-22, BMI 18-25) partook in recordings of ulnar nerve conduction velocities for baseline readings; immediately after submersion of the arm into 0 degree water for 45 seconds; and 60 minutes after intake of a 300mg caffeine tablet on a separate day. There was no significant difference found in conduction velocities before and 60 minutes after the intake of the caffeine tablet. There was found to be a significant decrease in ulnar nerve conduction velocity after exposure to 45 seconds of an ice-water bath. ($p<0.01$) The results of this study show that nerve temperature must be taken into account to obtain accurate recordings of nerve conduction velocities, and that caffeine intake may be overlooked for nerve conduction tests, at quantities under 300mg. These findings may also provide useful context to exercise physiologists who aim for greater nerve conduction and subsequent muscular efficiency.

THE EFFECTS OF CUTICULAR HYDROCARBONS ON THE DESICCATION RESISTANCE OF DROSOPHILA SPECIES

Cole Richards
Integrative Biology and Organismal Biology, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 523
Mentor(s): Henry Chung (ENTOMOLOGY), ZINAN WANG (ENTOMOLOGY)

Understanding how organisms deal with abiotic stress can help predict the adaptation and evolution of different species to diverse environments. For terrestrial organisms, one of the most important abiotic stresses is desiccation. Insects are the most diverse and abundant organisms on the planet and crucial to the environment. Their small body size positively correlates with water loss rate and therefore makes them vulnerable to desiccation. To prevent water loss, insects possess a lipid layer containing various types of hydrocarbons known as cuticular hydrocarbons (CHCs), which help to retain moisture. Due to the varying physical properties of different hydrocarbons, such as the melting temperature, the varied composition of this CHC layer has different efficiencies in retaining water and could confer different levels of desiccation resistance. Fruit flies (Drosophila spp.) have long been a model organism for the study of abiotic adaptations. Previous studies have shown that Drosophila species have different CHC profiles as well as varied levels of desiccation resistance. However, the way in which these CHCs contribute to the desiccation resistance is less understood. In this study, we investigated the desiccation resistance of 24 Drosophila species and analyzed the CHC composition of each using Gas-Chromatography/Mass-Spectrometry. We then applied a linear mixed model to understand the effects of the chemical type, length, and quantity of each CHC on desiccation resistance. This study will contribute to

understanding how insect species may be able to adapt to warmer and drier environments as climate changes occur in the coming years.

INTERPRETING THE SPOTTED HYENA (CROCUTA CROCUTA) GROAN: TRENDS IN RANK, AGE, AND RELATEDNESS

Summer Eckhardt, Taylor Carlini
Integrative Biology and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 703
Mentor(s): Kay Holekamp (INTEGRATIVE BIOLOGY)

The spotted hyena (Crocuta crocuta) lives in clans that exhibit a complex social structure and rich vocal communication. Despite years of study, we know very little about the spotted hyena's vocal signals. One of these signals, the groan, is emitted in multiple contexts during greetings, around nursing cubs, and sometimes before and after an aggression, but the function remains unknown. Here, we aim to gain a deeper understanding of the groan by evaluating behavioral notes on four clans between 2014-2018, and examining who the hyenas target their groans to. We will use this information to assess any possible trends in the groaner's rank, age, gender, and relatedness. Ultimately, we aim to test the hypothesis that the groan functions to 1) initiate a peaceful interaction and 2) to promote reconciliation after an aggressive exchange.

THE EVOLUTION OF SENSORY MORPHOLOGICAL DIFFERENCES BETWEEN LOWLAND FRESHWATER STICKLEBACK AND MARINE STICKLEBACK POPULATIONS WITHIN ICELAND.

Kodi Feldpausch
Integrative Biology and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 704
Mentor(s): Janette Boughman (INTEGRATIVE BIOLOGY), Robert Mobley (INTEGRATIVE BIOLOGY)

Climate change has dramatically altered the ecosystems in which organisms live, and it is increasingly important to protect and conserve these different environments and organisms. Specifically, glaciers have been melting at drastic rates as climate change and human development continues to progress. Understanding the varying behavior and ecology of different organisms can help implement more efficient conservation techniques. The sensory systems of all organisms can play a vital role in their behavioral ecology. Stemulón and Hraunfjór∂ur stickleback populations have evolved from a marine to a freshwater environment due to recent environmental changes. My work will use the sensory morphological data that is available within Dr. Janette Boughman's laboratory. I will analyze how the visual and mechanosensory systems have evolved in Icelandic stickleback populations, in order to distinguish the sensory adaptations amongst marine and freshwater environments. This work will provide understanding of how stickleback and other aquatic organisms are able to adapt in environments that are rapidly altered by climate change.

WHEN AND WHY DO SYMBIOTIC BACTERIA PRODUCE TETRODOTOXIN?

Zahraa Al-Tameemi
Integrative Biology and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 705
Mentor(s): Heather Eisthen (INTEGRATIVE BIOLOGY), Samantha Westcott (BIOLOGICAL SCIENCE PROGRAM)

The evolutionary arms race between rough-skinned newts (Taricha granulosa) and their garter snake (Thamnophis sirtalis) predators has led to extreme levels of toxicity in some newt populations. Their source of toxicity is tetrodotoxin (TTX), a neurotoxin that blocks voltage-gated sodium channels, inhibiting action potentials and causing death in most potential predators. Previous work in our lab revealed that TTX is produced by bacteria on the newts' skin, including bacteria from the genera Pseudomonas and Aeromonas. However, the biosynthetic pathway and factors affecting TTX production remain unknown. Moreover, the reason why these bacteria produce TTX is not understood. To address these issues, we will determine the growth rate of TTX-producing bacteria by counting colony forming units across consecutive time intervals to obtain growth curves. Additionally, we will quantify TTX production at the same time points along the growth curve using liquid chromatography-tandem mass spectrometry to identify the growth phases during which the bacteria produce TTX. The results will help us optimize future experiments by revealing details about the environmental conditions that encourage TTX production. Furthermore, knowing during which phase these bacteria produce TTX will help determine if the toxin is produced as part of a secondary metabolism pathway, providing insight into the reasons these bacteria produce it. These goals for understanding when bacteria produce TTX and whether it influences their ability to survive in their environment can help us begin to comprehend the role of these microbes as part of the complex newt skin microbiome.

ELEPHANTS ANTI-PREDATOR MOVES: JUVENILES SPEND MORE TIME CLOSER TO ADULTS

Hana Ohlrich, Jess Noeth
Integrative Biology and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 706
Mentor(s): Julie Jarvey (BIOLOGICAL SCIENCE PROGRAM), Lily Johnson-Ulrich (INTEGRATIVE BIOLOGY), Maggie Sawdy (INTEGRATIVE BIOLOGY)

One of the main benefits of sociality in mammals is protection from predation. However, elephants are highly social yet have very low predation rates due to their large size. We hypothesized that their group living in elephants is primarily adaptive for juveniles because they are susceptible to predation due to their smaller size. We conducted our study in the Maasai Mara National Reserve, Kenya. We specifically focused on the relationship between herd spatial structure and individual age classes. Elephants live in herds typically consisting of nine to eleven individuals rarely venturing more than 50 meters away from their closest neighbor. We predicted that the distance between individual elephants and the nearest adult would increase with size (i.e., small juveniles would be closest to adults). To test our hypothesis, we used scan sampling every two minutes and recorded the distance between small juveniles, medium juveniles, and adults to their nearest adult conspecific. While we found that there was no significant difference between small juvenile and medium juvenile distances to adults, both juveniles had significantly closer distances to adults than adults did to other adults. Our results support our hypothesis and suggest that elephants live in social groups because it is advantageous for the juveniles and young adults in the herd.

SEM ANALYSIS OF AEGAGROPILA LINNAEI AS A METHOD OF WATER PURIFICATION

Samantha Pendrick
Integrative Biology and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 708
Mentor(s): Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

One of the most pressing environmental issues is the pollution of our water sources from anthropogenic activities. This can cause eutrophication, referring to an excessive buildup of

nutrients in water bodies, which can result in blooms of microorganisms that secrete harmful toxins. Aegagropila linnaei is a species of algae that can be used to remove these toxins from our water. A scanning electron microscope (SEM) was used to image the microstructure of A. linnaei, which was found to be filamentous. According to outside literature, this branched structure increases the organisms' surface area, making it a viable candidate for water purification through phytoremediation. In this presentation, I will provide SEM images of Aegagropila linnaei accompanied by an analysis of its microstructure and an explanation of its ability to remove microbiological toxins in marine environments as demonstrated by outside research.

THE ROLE OF FOOD SCARCITY IN DETERMINING SOCIAL TOLERANCE IN FEMALE SPOTTED HYENAS

Ashley Dunn
Integrative Biology and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 709
Mentor(s): Kay Holekamp (INTEGRATIVE BIOLOGY), Tracy Montgomery (VETERINARY TEACHING HOSPITAL)

The distribution of resources plays an important role in determining the structure of animal social systems. Abundant and evenly distributed resources favor the evolution of absent or weak dominance hierarchies, while scarce and clustered resources favor strong ones. In some primates, it's been shown that the degree to which dominant individuals tolerate the presence of subordinates varies in response to food availability. This study explores the effects of food scarcity on social tolerance in a large social carnivore, the spotted hyena (Crocuta crocuta). Spotted hyenas live in large fission-fusion societies with stable female-dominated hierarchies. Access to food is controlled by dominant females. Here we predicted that social tolerance of subordinates by dominant females would increase when food is more abundant. The Mara Hyena Project has been collecting data on hyena behavior in the Masai Mara National Reserve since 1988. Between 1988-2016, I calculated social tolerance within each female-female dyad as the proportion of time the subordinate female fed relative to the time that both hyenas were present at observation sessions with carcasses. I then compared the average social tolerance in months with high versus low prey abundance, determined by whether or not the wildebeest migration was present. The results of this study will provide further insight into spotted hyena behavioral flexibility as well as the importance of ecological factors in shaping social behavior. The effects of food scarcity also have important implications for conservation, as human expansion continues to disrupt wild habitats and increase resource scarcity for wild animals.

EFFECTS OF PARASITISM ON REPRODUCTION IN THREESPINE STICKLEBACK (GASTEROSTEUS ACULEATUS)

Brooke Harper
Integrative Biology and Organismal Biology, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 710
Mentor(s): Janette Boughman (INTEGRATIVE BIOLOGY), Murielle Aalund (INTEGRATIVE BIOLOGY)

Reproductive success is a key component of an organism's fitness, indicating how well adapted it is to its environment. Individuals that are well adapted to local environmental conditions are thus expected to show high reproductive success, measured as a high number of offspring produced either during a given breeding season or over their lifetime. Reproductive success can be greatly influenced by parasites. Since parasites steal nutrients from their hosts, individuals who are parasitized require more energy to maintain their body

condition. However, food is often a limited resource, making it hard for individuals to forage enough to maintain body condition and produce energetically costly gametes. This causes a tradeoff between survival and reproductive success. Here we analyze data on female ovary size and egg number for 171 individuals from 15 populations of threespine sticklebacks (Gasterosteus aculeatus), and present results on the effect of parasitism by the cestode Schistocephalus solidus on ovary size and egg production. We discuss the value of comparing wild datasets from multiple populations for understanding how local ecology can influence reproductive strategies.

KINESIOLOGY

INFANT POSITIONING IN EARLY CHILDHOOD EDUCATION CENTERS

Briana McCary, Nicole Novak, Yuemei Lu
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 139
Mentor(s): Janet Hauck (KINESIOLOGY)

Positioning is a recognized aspect of development among infants. Considering the significance of infant positioning, there are infant positioning devices that serve as apparatuses designed to provide positional support for infants. The issue, however, with these positioning devices are that they may potentially impede on infant activity. Opportunities for movement, play, and independent support are at risk when these devices are overused. Congruently, childcare facilities are important facets as they too are important in infant development. Thus the proportion of time that infants are occupied in childcare and how positioning devices are used in that setting are important to document. Therefore, the purpose of this study is to observe the positioning of infants in early childhood education centers.

THE EFFECTS OF A FOUR-WEEK LOW LOAD PLYOMETRIC HOME EXERCISE PROGRAM ON QUADRICEPS STRENGTH FOLLOWING ACL RECONSTRUCTION

Henry Burghardt
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 140
Mentor(s): Tom Birchmeier (KINESIOLOGY)

Low-load plyometric jumping can improve knee function after ACL reconstruction (ACLR) during supervised rehabilitation, but the effects have not been assessed as part of a home exercise plan (HEP). Our purpose was to assess the effect of a four-week HEP on strength symmetry, jump height (JH), and reactive strength, among individuals with persistent strength asymmetry following ACLR. Identical pre- and post-intervention assessments were separated by 4 weeks (5.0±0.6 weeks). JH and Reactive Strength Index modified (RSIm) were assessed using 3-D motion capture during a single-leg countermovement jump. Peak torque (PT), strength, was assessed using an isokinetic dynamometer and normalized to bodyweight (Nm/kg). Limb symmetry indices (LSI) were calculated by dividing the ACLR limb by the healthy limb, then multiplying by 100. Exercise technique and HEP training followed the pre-intervention assessment. Separate one-way repeated-measures ANOVA were used to compare change pre to post-intervention. Magnitude of change was quantified using Eta squared effect sizes. Ten individuals (9F/1M; BMI=24.88±3.3; age=18.0±2.3 years; months since surgery=27.1±20.8) completed the intervention. Quadriceps PT LSI (9-mo=90%±18.2%LSI, p=0.16, η=0.03) and ACL limb RSIm (9-mo=0.31±0.10 m/s, p=0.2, η=0.07)

did not improve, but ACL limb JH (9-mo=0.30±0.07 cm, p<0.001, η=0.85) significantly improved post-intervention. Despite nonsignificant improvement in quadriceps strength symmetry, it did reach 90% LSI, which is associated with decreased risk of secondary ACL injury.

OBJECTIVELY MEASURED PHYSICAL ACTIVITY IN PEDIATRIC INDIVIDUALS WITH AND WITHOUT HISTORY OF ACL RECONSTRUCTION

Skylar Mack
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 141
Mentor(s): Christopher Kuenze (KINESIOLOGY), Katie Collins (KINESIOLOGY)

Background: National Guidelines outline the amount of moderate-to-vigorous intensity aerobic physical activity (MVPA) for individual participation. There is evidence that less than 10% of Americans meet these recommendations and that musculoskeletal injury may be a barrier for participation. The purpose of this study was to investigate the impact of anterior cruciate ligament injury and subsequent reconstruction (ACLR) on MVPA participation as compared to uninjured controls. Methods: Twenty individuals with history of ACLR (Age:15.8±1.2Years, BMI:24.8±5.0kg/m2, Sex:5M/15F, Months Since Surgery:6.2±0.7Months) and twelve healthy-matched controls (Age:14.9±1.2Years, BMI:24.0±2.5kg/m2, Sex:8M/4F) participated in this study. Objective measurements of free-living physical activity were recorded by Actigraph GTX9 Link accelerometers worn for 7 days at the right hip. Physical activity data were compared between the ACLR and healthy groups utilizing a one-way ANOVA. Alpha was set a priori at P<0.05. Results: There was a significant difference between average steps per day of ACLR participants and healthy-matched controls (ACLR:6001.2±1781.1 Steps/day, Healthy:7717.3±2324.5 Steps/day, p=0.041). There were no significant differences between groups for % MVPA (ACLR:4.2%±2.1%, Healthy:5.5%±3.0%, p=0.196) and average time (minutes) spent in MVPA per day (ACLR:32.6±17.4 Minutes, Healthy:44.1±23.6 Minutes, p=0.162). Conclusions: No significant differences in MVPA were identified between ACLR and uninjured groups. However, individuals with history of ACLR demonstrated fewer steps per day than their uninjured counterparts. Differences in steps per day may signify an overall decreased activity level following injury. However, consistent levels of MVPA may support previous reports that pediatric individuals with history of ACLR are recreationally active, participating in similar intensity activity following injury.

DOES VARIATION IN TASK PRACTICE FACILITATE LEARNING OF A MOTOR SKILL?

Kayla Okray, Madeleine Motloch, Megan Miller
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 142
Mentor(s): Rajiv Ranganathan (KINESIOLOGY)

Practice is essential for the learning of motor skills but not all practice is the same—i.e., several factors can influence how learning is affected during practice. One such factor is the 'variability' of practice—i.e. where practice is mixed up to include variations of the task to be performed. For example, free throws in basketball can be practiced from the free throw line (specific practice) or from a combination of other positions (variable practice). We examined if variable practice would enhance the retention of movement skills even if the goal was only to perform a single task. In our study, participants performed a 'virtual shuffleboard' task and slid a virtual puck towards targets located at different distances. Participants were distributed randomly into two groups - 'Specific' and 'Variable'. In the 'Specific' group, practice was always to a single target whereas the 'Variable' group practiced with four additional targets. Both groups received practice on one day and then were given a retention and transfer test

after a ~24-hour period to assess their learning. We will compare the learning of the two groups in the retention and transfer tests by quantifying the task performance—i.e. the average distance by which the puck missed the target. These results will allow for broader implications into sports and rehabilitation by allowing better practice schedules to be designed in order to maximize learning of the tasks.

A COMPARISON OF IPD USE IN INFANTS WITH AND WITHOUT DOWN SYNDROME

Kelsey Kribs
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 143
Mentor(s): Janet Hauck (KINESIOLOGY), Yuemei Lu (KINESIOLOGY)

Introduction: Infant positioning devices (IPD) are being used more frequently now than in the past. These devices are designed to provide positional support by constraining infants' movement, which could limit their opportunities for physical activity and motor skill development. Down syndrome (DS) is a genetic disorder caused by the presence of a third copy of chromosome 21 which causes developmental delay in several domains, especially motor delay. However, little is known about the IPD use in infants with DS due to the delay in achieving motor milestones and how it is different from that in infants without DS. The purpose of this study is to determine if there is a difference in IPD use between infants with Down syndrome and infants with typical development (TD). Method: Sixteen infants (TD=11; DS=5) participated in this longitudinal study. Caregivers reported the duration of IPD use while awake once monthly from one to six months of age and then again at 12 months and 18 months of age. Repeated measures ANOVA was used to determine differences overtime in total minutes of use between groups. Results: There was a statistically significant difference in wakeful IPD use between groups [$F = 4.870$ (1, 14), $p = 0.045$]. Infants with DS used IPDs significantly more than infants with TD. Discussion: Infants with DS use IPDs significantly more than their age-matched peers with TD. This study could guide future research to investigate the influence of IPD use on motor skill acquisition in infants with DS.

AN EXAMINATION OF CLINICIAN PERCEPTIONS OF FUNDAMENTAL MOVEMENT SKILLS AND PHYSICAL ACTIVITY FOR CHILDREN WITH ASD

Devin Austin
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 144
Mentor(s): Isabella Felzer-Kim (KINESIOLOGY), Janet Hauck (KINESIOLOGY)

The goal of our study is to examine how clinicians perceive fundamental movement skills in children with autism spectrum disorder (ASD). Fundamental movement skills are often delayed in children with ASD, and there is evidence that these delays become larger with age (Lloyd et al, 2011). To examine what practicing physical therapists (PTs) and occupational therapists (OTs) think about the motor domain and ASD, we created an online survey to record the perceptions of 58 PTs and OTs. Using this survey, the perceptions of the clinicians were explored to determine their knowledge of physical activity for children with autism as well as what skills they perceive to be difficult. Our results indicated that while 77.5% of clinicians noticed possible motor delay in their patients with ASD, only 39.6% of those patients were referred out for further motor testing. Our results also indicated that of the fourteen fundamental motor skills, clinicians ranked "run" as the most important and easiest skill to teach. This study emphasizes the need to implement intervention strategies that educate clinicians on how the fundamental skill levels of children with ASD are the same as children without. Through these interventions, we can address one of the issues that lead to children with ASD falling behind when it pertains to developing fundamental motor skills.

EXAMINING THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND RECOVERY OUTCOMES AFTER SPORTS-RELATED CONCUSSION

Devon Topp, Hope Koester, Kelsey MacDonald
Kinesiology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 145
Mentor(s): Kyle Petit (KINESIOLOGY), Tracey Covassin (KINESIOLOGY)

Mental and physical rest after sport-related concussion (SRC) is a common recovery technique immediately following injury. However, it is unknown how physical activity (PA) participation after the acute concussion phase affects recovery outcomes for college-aged individuals. The purpose of this study was to quantify PA participation after SRC, and to examine the relationship between this activity and concussion recovery outcomes in college-aged adults. Twenty-four participants completed a 23-item symptom evaluation within 72 hours of SRC occurrence. Participants received an Actigraph GT9X Link PA Monitor to measure post-concussion PA. Eight days later, participants repeated the symptom evaluation. Partial correlations assessed the relationship between post-concussion PA (steps per minute (SPM), percent time performing moderate-to-vigorous PA (MVPA)) and concussion recovery outcomes (symptom severity from visit 2, recovery time) while controlling for participant sex (aprior $p<.05$). Participants spent an average of 31.3%±6.9% of their time in MVPA and averaged 13.4±2.2 SPM. A symptom severity of 3.0±5.0 was recorded at visit 2 and participants took 12.3±4.8 days to recover. No relationship was found between post-concussion PA and symptom reporting (MVPA: $p=.286$; SPM: $p=.219$) or recovery time (MVPA: $p=.430$; SPM: $p=.952$). The current study identified no association between PA participation and SRC symptom reporting or overall recovery time. This may be because the PA was not challenging enough to see an effect, and suggests that more intense PA is necessary to improve recovery outcomes. Future research should examine if a more vigorous PA plan, which increases heart rate, could improve SRC recovery outcomes.

SELF-REGULATION AND SOCIAL COMPETENCE WITHIN YOUTH SPORT PARTICIPANTS

Kayla Knoche
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 307
Mentor(s): Karl Erickson (KINESIOLOGY)

Past research suggests the benefits of youth sport participation for varying developmental characteristics (i.e. social, emotional) (Côté & Fraser-Thomas, 2010). Studies have linked self-regulation and social competence within an educational context leading to positive developmental outcomes throughout adolescence and later adulthood (Hamre, Hatfield, Pianta, & Jamil, 2014; Hamre & Pianta, 2001). However, there is rarely representation of children at the age of nine and younger in youth sport research, especially relating to social and emotional characteristics. This study aimed to explore the potential correlation between self-regulation and social competence in youth sports. Self-regulation is the ability to manage one's behavior whereas social competence is the ability to conduct oneself and connect with others in social settings. Higher self-regulation was hypothesized to be associated with a higher social competence. 137 parents of U9 athletes were recruited for data collection. At a youth sport practice, the Social Competence and Behavior Evaluation (Lafreniere & Dumas, 1996) was provided for parents to evaluate their child's social competence. Once parental consent was obtained, self-regulation was measured using the Head-Toes-Knees-Shoulders task (McClelland et al., 2007) during or after practice with each child. An independent t-test was used to determine the correlation between self-regulation and social competence. The results indicated the correlation is not significant. These findings suggest that the ability of

young children to control their behavior is not indicative of their social interactions and/or relationships. This shows that there may be no static structure to development and vary depending on individual characteristics of each child.

CONTACT SPORT PARTICIPATION AND SPORT-RELATED CONCUSSION TRENDS IN HIGH SCHOOL ATHLETICS

Cameron Lizyness, Therese Deutsch
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 308
Mentor(s): Morgan Anderson (KINESIOLOGY), Tracey Covassin (KINESIOLOGY)

Sport related concussion (SRC) represent 15% of high school sport injuries, which may contribute to decreased contact sport participation and the implementation of strategies to address SRC prevalence. Investigating contact sport participation and SRC prevalence trends is warranted. The purpose was to examine trends in contact sport participation and SRC clinical incidence in Michigan high school athletes between the 2015-2016 and 2018-2019 seasons. Data were reported by athletic trainers to the Michigan High School Athletic Association's (MHSAA) Head Injury Reporting System. Participants included contact sport athletes from 755 high schools across Michigan. Clinical incidence was calculated by dividing the number of concussed athletes by the total number of participants. Linear regression, with 95% confidence intervals (CI), examined contact sport participation and SRC clinical incidence trends. Participation totaled 724,784 athletes (male=436,509, female=288,275); football (n=144,708), boys basketball (n=85,288) and volleyball (n=76,950) had highest participation. Sport participation significantly decreased from 184,285 to 177,982 (p=.02). Football (p=.01) and baseball (p=.02) participation decreased; 8-man football (p=.03) and boys lacrosse (p=.03) participation increased. A total of 15,300 SRCs occurred, yielding a 2.11 clinical incidence rate (95% CI:2.08-2.14). Football (4.52, 95% CI:4.41-4.62), boys ice hockey (3.51, 95% CI:3.20-3.82), and 8-man football (3.35, 95% CI:2.85-3.85) yielded the highest SRC clinical incidence. No significant trends were identified for overall SRC clinical incidence (p=.14); however, girls basketball significantly decreased in SRC clinical incidence (p<.05). Overall, contact sport participation decreased, possibly due to growing SRC awareness and media attention. Researchers should explore SRC reduction strategies in contact sports, especially football.

EXAGGERATED BLOOD PRESSURE RESPONSES TO EXERCISE IN MIDDLE-AGED ATHLETES: EVALUATING THE AGREEMENT BETWEEN TWO DIFFERENT CRITERIA

Anna Nguyen, Rachael Cohen
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 309
Mentor(s): Katharine Currie (KINESIOLOGY)

Exaggerated blood pressure (BP) responses during exercise, traditionally defined as a systolic BP >190 and >210 mmHg for women and men, respectively, are predictive of future cardiovascular events. More recently, the change (D) in BP relative to the change in cardiorespiratory fitness [assessed using maximal oxygen uptake (VO2max)], has been shown to predict future mortality. The purpose of this study was to assess the agreement between these two criteria used to define an exaggerated BP response. Eighty-eight life-long endurance athletes (61 men: 54±6 years; 27 women: 53±5 years) completed a custom treadmill protocol to assess their VO2max. Speed and incline increased as the test progressed until volitional exhaustion. BP was measured throughout the test and VO2max was determined at end of test. An exaggerated BP response was identified as 1) a maximal systolic BP >190 and >210 mmHg for women and men, respectively, and 2) a D systolic

BP/ DVO2 > 6.2 mmHg/metabolic equivalent, and the agreement between these two criteria was determined using Cohen's Kappa. There was moderate agreement (k=0.52, p<0.001, 95% confidence intervals 0.32-0.72) in men and fair agreement (k=0.36, p=0.05, 95% confidence intervals 0.00-0.74) in women, between the two criteria. Thus, despite evidence demonstrating the prognostic value of both criteria, our findings suggest that they may not be interchangeable. Furthermore, we observed sex differences in the level of agreement between exaggerated BP criteria which warrants further investigation.

HOW DOES PRIOR EXPERIENCE HELP WITH LEARNING A NEW MOTOR SKILL QUICKER?: INFLUENCE OF TASK SIMILARITY ON TRANSFER OF LEARNING

Eva Kaplinski
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 310
Mentor(s): Rajiv Ranganathan (KINESIOLOGY)

When learning a new motor skill, previous memories of a different yet related motor skill may either interfere with or facilitate the learning of the new motor skill. For example, in racquet sports, learning to play tennis might be affected by prior experience in badminton. Although the similarity between skills has been hypothesized to play an important role in learning, quantifying the degree to which two tasks are similar is difficult for real-world tasks. To overcome this issue, we used a novel virtual task where we can precisely quantify the degree to which two tasks are similar. Participants wore a glove with sensors that measured the movement of the fingers to control a computer cursor. The 'map' of how finger motions related to cursor motion was not known to the participants. Participants learned two tasks—a 'prior' task that they initially learned on Day 1, and a 'criterion' task they learned on Day 2, and we manipulated the degree of similarity between the prior and criterion tasks by adjusting the map between finger and cursor motion. We will examine how task similarity affects learning of the criterion task through variables such as the movement time and the path length. These results will further our understanding of how task similarity affects motor learning.

THROUGH A YOUTH SPORT LENS: SELF-REGULATION IN YOUNG CHILDREN 9 YEARS OF AGE AND YOUNGER

Normand Xavier
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 311
Mentor(s): Karl Erickson (KINESIOLOGY)

Youth sport is a popular recreational activity that has the ability to impact child development when using a positive youth development (PYD) approach (Holt, 2016). One developmental characteristic is self-regulation, which refers to a set of skills related to the behavior and executive function of children (McClelland et al., 2007). Although developmentally different, youth sport research focuses primarily on adolescents with limited knowledge surrounding children 9 years old and younger (Côté & Fraser-Thomas, 2010). Therefore, research that focuses on these young children is necessary, especially exploring developmental differences between adolescents and younger children.This correlational study collected quantitative data through a demographic questionnaire and Head-Toes-Knees-Shoulders task (HTKS). HTKS was used to assess the self-regulation level of the young children (McClelland et al., 2007). At youth sports practices, parents of 127 children aged 9 and younger were recruited to participate and completed a consent form along with a questionnaire. After completing the parental consent form, the HTKS test was performed with each young child. The study results showed a positive correlation between age and HTKS scores. An independent t-test showed a significant difference (p=0.001) in HTKS scores between the children grouped age 4-6 (n=39)

and aged 7-9 (n=88). These findings give the rationale to help youth sport coaches understand this unique population. Further, to provide guidance for coaches' communication style and type of practice to match the developmental level of their athletes.

PHYSICAL ACTIVITY AND BODY COMPOSITION OF WOMEN WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: A PILOT PROJECT

Samantha Gregoire
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 312
Mentor(s): Ashley Triplett (KINESIOLOGY), Christopher Kuenze (KINESIOLOGY)

Women with ACL reconstruction (ACLR) are 2.36x less likely to be physically active than healthy individuals. It has also been reported that body mass index (BMI) remains elevated up to 2 years post-ACLR, but the effects of ACLR on body composition following surgery is unclear. To compare physical activity (PA) engagement and body composition between women with ACLR and healthy matched controls. Ten women with ACLR (33.0±18.3months post-surgery, age=21.4±3.8yrs, BMI=26.1±3.8kg/m2) and 10 healthy women (age=21.9±3.1yrs, BMI=21.8±2.5kg/m2) participated. Body fat percentage (%BF) and fat mass were estimated using air displacement plethysmography and were compared between groups using Mann-Whitney U tests.Objective PA was assessed using hip-worn accelerometers. Time (minutes/week) spent in moderate-to-vigorous PA (MVPA) and step count (steps/day) were compared between groups using one-way ANCOVA with total wear time as a covariate. Women with ACLR had higher %BF than controls (ACLR=32.7±6.7%, healthy=22.6±4.9%; $p<0.01$) and higher fat mass (ACLR=25.4±9.0kg, healthy=13.7±4.1kg; $p<0.01$). Healthy women participated in more steps/day (ACLR=6650±3227 steps/day, healthy=9361±2626 steps/day; $p=0.02$), but no differences in MVPA (ACLR=367.2±226.2 mins/week, healthy=448.9±164.0 mins/week; $p=0.34$) were observed. Women with ACLR engage in similar levels of MVPA compared to controls, but they may have greater %BF and fat mass than women without ACLR. Women with ACLR also have lower step counts, which is consistent with previous studies. Low PA, high %BF, and high BMI increase the risk of premature mortality and morbidity. Therefore, it is crucial to assess these characteristics and determine potential interventions to promote PA and maintenance of healthy body composition following ACLR.

INTERNAL AND EXTERNAL FACTORS AFFECTING CONCUSSION NON-DISCLOSURE IN COLLEGIATE STUDENT-ATHLETES

Joel Erickson, Melissa Farnen
Kinesiology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 313
Mentor(s): Morgan Anderson (KINESIOLOGY), Tracey Covassin (KINESIOLOGY)

Lack of proper concussion identification can lead to serious health consequences including catastrophic injury or prolonged concussion recovery; therefore, understanding internal and external factors as to why athletes do not disclose their concussion may help clinicians implement educational strategies. The purpose of this study was to examine predictors of concussion non-disclosure in collegiate student-athletes. This is a cross-sectional, multi-site study of National Collegiate Athletic Association (NCAA) student-athletes (n=741) from Division-I and Division-II universities. Student-athletes completed a survey including personal and sport demographics, diagnosed concussion and non-disclosed concussion history, concussion knowledge, and pressures from external sources experienced during collegiate sport participation. The predictor variables were age, sex, sport risk type, concussion history, concussion knowledge, and pressure from external sources and the outcome variable was

concussion non-disclosure. Univariate logistic regressions were conducted on each predictor variable with significant univariate variables analyzed in a multivariate logistic regression. Significance was set at p<.05. After univariate analyses, sex (p<.005), sport risk type (p<.000), diagnosed concussion history (p<.000), concussion knowledge (p<.017), pressure from teammates (p<.000), coaches (p<.000), parents/family (p<.003), and fans (p<.001) were significant predictors. Males (OR:2.28 [95% CI:1.40, 3.71]; p<.001), contact sport participation (OR:1.81 [95% CI:1.01, 3.25]; p<.048), diagnosed concussion history (OR:2.31 [95% CI:1.49, 3.58]; p<.000), concussion knowledge (OR:1.08 [95% CI:1.02, 1.13]; p<.013), and experiencing pressure from coaches (OR:2.69 [95% CI:1.447, 5.01]; p<.002) were all significant predictors after multivariate analyses. Understanding internal and external factors of concussion non-disclosure are pivotal in order to implement specific strategies for athletes, clinicians, and coaches to improve reporting behaviors.

EFFECTIVENESS OF IN VIVO EXPOSURE THERAPY ON IMPROVING VISUAL-MOTOR SPEED IN PATIENTS POST ACL-RECONSTRUCTION

Joshua Stevens
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 493
Mentor(s): Shelby Baez (KINESIOLOGY)

Physical activity (PA) engagement has been demonstrated to improve visual-motor speed. However, patients after anterior cruciate ligament reconstruction (ACLR) often do not meet required levels of PA due to increased injury-related fear. However, we do not know if implementation of a psychological intervention to address injury-related fear, such as in vivo exposure therapy (IVET), can lead to improvements in visual-motor speed. The aim of this study is to examine if IVET can improve visual-motor speed in patients post-ACLR. We hypothesized that those who undergo IVET will exhibit faster visual-motor speed when compared to a PA monitoring control group. A randomized controlled trial was used to examine the effectiveness of a 5-week IVET on individuals with a history of ACLR. Twelve female participants (age=22.5±4.6yrs, height=166.6±9.6cm, mass=67.2±9.7kg) with a history of ACLR (≥ 1-year post-operative) were randomized into an intervention group (n=6) or control group (n=6). Participants in the control group monitored their PA levels via a pedometer for 5-weeks. A Group x Time repeated measures two-way analysis of variance was completed. Partial η2 effect sizes were calculated to examine the magnitude of differences between Group and Time. A Group x Time interaction effect was observed ($F_{1,10}$ =5.01, p=0.049, partial η2=0.33). Interestingly, those who monitored their PA for 5-weeks observed faster visual-motor speed at the post-assessment (baseline =44.75±5.81; post-assessment =47.86±3.67) when compared to the IVET group (baseline=44.12±4.78; post-assessment =42.52±8.41). Physical activity monitoring may have encouraged control participants to increase PA levels. Increased PA may have led to increased visual-motor speed.

HOW DOES REMOVAL FROM ACTIVITY FOLLOWING SPORT-RELATED CONCUSSION DIFFER BETWEEN BOYS AND GIRLS IN MICHIGAN?

Anna Metter, Samy Shelbaya
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 494
Mentor(s): Aaron Zynda (KINESIOLOGY)

The increasing prevalence of sport-related concussions (SRC) and their potential consequences call for focus on the timely reporting and immediate removal from activity. There is a discrepancy between the incidence of removal of boys versus girls following a suspected SRC. The purpose of this study was to compare the incidence of high school

athletes not removed from activity following SRC in sex-comparable sports in Michigan. Athletes participating in Michigan High School Athletic Association (MHSAA) sponsored sports were recorded in a Head Injury Reporting System. Sports included basketball, baseball/softball, and soccer. Incidence was calculated by dividing SRCs not removed by total SRCs, while risk ratios were calculated by dividing the incidence of girls not removed by boys not removed in each sport. A total of 442 girls and 182 boys were not removed from activity, resulting in incidences of 0.18 (95% CI, 0.17-0.20) and 0.14 (95% CI, 0.12-0.16) per 100 student-athletes, respectively. Across the three sports, girls were 1.27 (95% CI, 1.09-1.49) times as likely of not being removed from activity compared to boys. Girls soccer had the largest risk ratio of 1.41 (95% CI, 1.12-1.78) and number of reported SRCs (n = 1024). A growing number of athletes are diagnosed with SRC each year, but a handful of athletes continue activity after sustaining a suspected SRC. Although seemingly counterintuitive, following a suspected SRC, girls are removed from activity less when compared to boys. Removal from activity after a suspected SRC is essential to the prevention of further injury.

CONCUSSION HISTORY AND KNEE SELF-EFFICACY FOR PHYSICAL ACTIVITY IN PATIENTS AFTER ACL RECONSTRUCTION

Britney Inthavong
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 495
Mentor(s): Shelby Baez (KINESIOLOGY)

Previous research suggests that knee self-efficacy is associated with physical activity levels in patients after anterior cruciate ligament reconstruction (ACLR). However, we do not know if history of sports-related concussion (SRC), which can lead to changes in emotional regulation, may influence knee self-efficacy for physical activity in patients after ACLR. Therefore, the aim of this study is to examine differences in knee self-efficacy for physical activity in patients after ACLR with a history of SRC compared to patients after ACLR without history of SRC. We hypothesized that the ACLR group with a history of SRC will exhibit worse knee self-efficacy for physical activity when compared to the ACLR group without a history of SRC. Forty participants (24 female, mean age = 24.3±4.1 years; height (cm) =169.9 (9.1); weight (kg) = 73.2 (15.1)) with a history of ACLR (≥1-year post-operative) were put into a No SRC group (n=29) or SRC group (n=11). The Knee Self-Efficacy Scale for Physical Activity, which is scored 0-10, was used to examine knee self-efficacy. Higher scores represented higher knee self-efficacy. A Mann-Whitney U test was used to examine between group differences. Statistically significant differences between the SRC group (Median= 7.5; Range= 5.34) and the No SRC group (Median= 8.17; Range= 6.17) was observed (p= 0.0025). Individuals with a history of ACLR in the SRC group exhibited worse knee self-efficacy for physical activity compared to the ACLR group with no SRC. These results suggest that SRC history may negatively influence knee self-efficacy in patients after ACLR.

CONCUSSION HISTORY AND LOWER-EXTREMITY FUNCTION IN PATIENTS AFTER ACL RECONSTRUCTION

Tyler Schisler
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 496
Mentor(s): Shelby Baez (KINESIOLOGY)

Return to sport (RTS) criteria for patients after anterior cruciate ligament reconstruction (ACLR) suggests that patients score >90% limb symmetry index (LSI) on hop testing prior to clearance to RTS. However, we do not know if history of sports-related concussion (SRC) can influence hop performance in individuals with a history of ACLR. The purpose of

this study was to examine differences in LSI between individuals with a history of ACLR and SRC compared to an ACLR group without history of SRC. We hypothesized that individuals with a history of ACLR and SRC would have worse LSI on hop testing. Forty participants (24 female; mean age = 24.3±4.1 years; height (cm) =169.9 (9.1); weight (kg) = 73.2 (15.1)) with a history of ACLR (≥1-year post-operative) were separated into a SRC group (SRC;n=11) and no SRC group (NO SRC;n=29). Participants reported to the laboratory to complete a demographics questionnaire and hop testing (i.e. single-leg hop for distance, crossover-hop for distance, and triple-hop for distance). SRC history was self-reported. LSI was calculated using the following equation: (mean distance involved limb/mean distance uninvolved limb) x100. Mann-Whitney U tests were used to examine between group differences. No statistical differences were observed for the single-leg hop or triple-hop, but was observed for the crossover-hop (SRC =0.96 (0.35), NO SRC = 1.02 (0.34), p=0.006). The crossover-hop is a more challenging task that is better representative of sports participation. These results suggest that SRC history may influence lower-extremity functional performance in patients after ACLR.

MORE THAN JUST PLAYING AROUND: MANUAL EXPLORATION DURING EARLY CHILDHOOD HELPS TO LEARN OBJECT PROPERTIES

Amanda Lopez, Autumn Bennett, Stephanie Tran
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 497
Mentor(s): Mei Li (SUPPLY CHAIN MANAGEMENT), Priya Patel (KINESIOLOGY)

When an infant is given a rattle, they usually put it in the mouth; however, by their first year, they learn to play with it by shaking it. Such a transition in their actions is achieved after manual exploration—a process by which infants learn about the properties of objects that they hold, thereby helping them learn how to effectively interact with objects. While manual exploration changes continue past infancy, these changes as a function of object properties are yet to be assessed systematically during early childhood. Therefore, the purpose of this study is to assess manual exploratory behaviors as a function of age and object properties (size, texture, and shape) during early childhood. To address this aim, manual exploratory behaviors were observed in typically developing infants (5 - 12 months) toddlers and preschoolers (1 - 5 years) for different objects. Using video cameras, participants' exploratory behaviors were recorded while they explored 8 objects that varied in size (2" vs. 4"), texture (soft vs. hard) and shape (ball vs. cube). Preliminary findings indicate that when approaching an object, participants used 1 or 2 hands based on object size and texture. However, after grasping it, exploratory behaviors depended mainly on object size and shape. The findings from this study will not only contribute to the developmental trajectory of manual exploratory changes during early childhood but may also provide insight into atypical exploration in developmental disorders such as autism.

PHYSICALLY ACTIVE LEARNING AND QUANTITY ESTIMATION IN PRESCHOOLERS

Julie Braggs, Laura Scarcelli
Kinesiology, Poster Presentation
Section: 3, 3:00 - 4:30 PM
Presentation Number: 498
Mentor(s): Amanda McGowan (KINESIOLOGY), Hope Gerde (HUMAN DEVELOPMENT AND FAMILY STUDIES), Matthew Pontifex (KINESIOLOGY)

Physically active lessons have been associated with improved math achievement scores. Although these approaches improve physical activity levels and on-task behavior, their influence on learning remains unknown. This study examined the effects of physically active learning on children's quantity estimation and on-task behavior in a controlled laboratory

setting. Preschool-aged children (n = 72; 4-5 y) were separated into physically active or seated learning conditions. Children's quantity estimation was assessed using a computerized game before and after the experimental conditions and one week later. Children wore a heart rate monitor and pedometer during each experimental condition to classify intensity. Additionally, off-task behavior was recorded by a trained observer during the computer game. Although no differences in quantity estimation were observed between physically active and seated learning at posttest or one week later, children showed reduced off-task behavior immediately following physically active learning. Children took on average 900 more steps during physically active learning relative to the seated learning. Overall, integrating physical activity with numeracy skills helps children stay more on-task while acquiring the benefits associated with increased physical activity.

IMPACT OF CONCUSSION ON STATE AND TRAIT ANXIETY ACROSS RECOVERY

Brenna Stotlemeyer, Caroline Szabo, Emily Bossie
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 499
Mentor(s): Chris Tomczyk (KINESIOLOGY), Tracey Covassin (KINESIOLOGY)

Concussion may influence state (SA) and trait anxiety (TA), which could impact recovery trajectories. The purpose of this study was to examine the effect of concussion on SA and TA throughout recovery. The State Trait Anxiety Inventory was administered to concussed individuals (Cx) within 72 hours of injury (Day 0), 5 days post-injury (Day 5) and following full medical clearance (FMC). Healthy controls (HC) followed the same protocol. Separate 2 group x 3 time repeated measures ANOVA were performed for both anxiety scales. Eighty-five participants (Cx=43, age= 18.56±2.55 years; HC=42, age= 18.10±2.56 years) were enrolled. There was a significant group x time interaction ($v=0.17$, $F(1.87, 83)=10.33$, $p<0.001$, $\eta2=0.11$) for SA. The Cx group experienced greater SA at Day 0 (Cx: 41.05±11.03, HC: 28.79±8.59, $t=5.71$, $p<0.001$), Day 5 (Cx: 34.95±12.97, HC: 27.90±9.65, $t=2.84$, $p=0.01$), and FMC (Cx: 30.95±9.67, HC: 26.43±7.64, $t=2.39$, $p=0.02$) compared to HC. No interaction ($F(1.79, 82)=1.20$, $p=0.31$) occurred for TA, but significant main effects for time ($F(1.79, 82)=29.10$, $p<0.001$, $\eta2=0.26$) and group ($F(1, 82)=29.10$, $p=0.02$, $\eta2=0.07$) were found. Both groups decreased across time (Day 0: Cx= 38.81±11.17, HC= 32.74±10.00; Day 5: Cx= 36.95±11.83, HC= 31.24±10.23; FMC: Cx= 34.65±11.37, HC= 29.98±9.05), and the Cx group had higher TA (Cx=6.81, SE=1.61; HC=31.32, SE=1.63). These findings may demonstrate that following a concussion there is increased state anxiety, along with a shift in perceptions of stress. These changes may warrant altered treatment procedures during concussion recovery.

IMPLEMENTATION OF MOTOR SKILLS IN PRESCHOOL CHILDREN WITH AUTISM SPECTRUM DISORDER AND ITS EFFECTS ON PROBLEM BEHAVIORS.

Kallie Jimmerson
Kinesiology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 500
Mentor(s): Isabella Felzer-Kim (KINESIOLOGY), Janet Hauck (KINESIOLOGY)

Delayed social and motor development of children with Autism Spectrum Disorder (ASD) strongly affects their behaviors. Each child's ASD symptomology differs, which gives rise to problem behaviors of various severity. Motor interventions are used to treat delays in motor development. To better understand how children with ASD are behaviorally affected by motor intervention, this study looks at how problem behaviors in children change when motor intervention is implemented. Gross motor intervention was implemented over a 20-week period with 14 children. Intervention occurred four days a week and lasted for fifteen minutes at each session. During the sessions, the children worked one-on-one with their BT on 13

fundamental motor skills. The randomly selected control group did not receive any intervention. Behavior therapists (BTs) filled out problem behavior sheets every fifteen minutes that tallied what kind and how many of each problem behavior each child had throughout the eight-hour school day. These sheets were compiled, and descriptive statistics were used to determine whether problem behaviors progressed with intervention. The data provides a comparison between children that received motor skill intervention and those that did not. The data is representative of two months before intervention started and the three months during which the motor intervention was implemented. Trends show that when the intervention started, problem behaviors per day began increasing in the intervention group. This study highlights how implementing a motor intervention affects problem behaviors for preschoolers with ASD. These results are relevant for further implementation of interventions for children with ASD.

NO SEX DIFFERENCES IN INJURY-RELATED FEAR IN PATIENTS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Lauren Grasso
Kinesiology, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 679
Mentor(s): Shelby Baez (KINESIOLOGY)

Patients after anterior cruciate ligament reconstruction (ACLR) can exhibit increased injury-related fear which may inhibit ability to return to sport. Previous research has demonstrated sex differences in emotional regulation. However, we do not know if sex differences in injury-related fear exist in patients after ACLR. Therefore, the purpose of this study is to examine sex differences in self-reported injury-related fear in patients after ACLR. We hypothesized that females with history of ACLR will exhibit increased injury-related fear when compared to males with a history of ACLR. Forty participants (29 females and 11 males; mean age = 24.3±4.1 years; height (cm) =169.9 (9.1); weight (kg) = 73.2 (15.1)) with a history of ACLR (≥1-year post-operative) were enrolled. Participants reported to the laboratory to complete a demographics questionnaire and questionnaires that assessed injury-related fear. Mann-Whitney U tests were used to examine between group differences ininjury-related fear as measured by the Fear-Avoidance Beliefs Questionnaire (FABQ) and the Tampa Scale of Kinesiophobia-11 (TSK-11). Both males (TSK-11 = 19(16); FABQ = 15(36)) and females (TSK-11= 17(18); FABQ=21(52)) exhibited increased injury-related fear. However, no statistical differences were observed between males and females for the FABQ (p=0.98) or the TSK-11 (p=0.15). These results suggest that there are no sex differences in injury-related fear in patients after ACLR. However, injury-related fear continues to be present in patients despite being a minimum of 1-year post surgery. Psychological interventions to address injury-related fear, such as in vivo exposure therapy, need to be explored in this population.

KNEE KINEMATICS DURING WALKING 4 MONTHS POST-SURGERY ARE ASSOCIATED WITH FEMORAL ARTICULAR CARTILAGE CHARACTERISTICS AT 6 MONTHS FOLLOWING ACLR

Tess McGuire
Kinesiology, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 680
Mentor(s): Caroline Lisee (KINESIOLOGY), Christopher Kuenze (KINESIOLOGY), Tom Birchmeier (KINESIOLOGY)

Patients are at high risk of developing knee osteoarthritis (KOA) after anterior cruciate ligament reconstruction (ACLR). Altered gait biomechanics are associated with poor knee joint articular cartilage health years after ACLR, but have not been assessed during early

surgical recovery. The purpose of this longitudinal study was to assess relationships between high-risk gait biomechanics associated with KOA and articular cartilage characteristics in individuals between 4-6 months post-ACLR. At four-months post-ACLR, ten participants (age=21.20±1.92 years, BMI=24.67±1.39 kg/m2, months since surgery=4.53±0.08) completed a gait assessment of knee kinematics and kinetics. At six-months post-ACLR, participants returned for a bilateral ultrasound image assessment of resting femoral articular cartilage. The images were segmented into three compartments (lateral, middle, medial) to calculate average thickness and cross-sectional area (CSA) of the cartilage. Relationships between gait and cartilage outcomes were evaluated using Spearman's rank correlation coefficients. For the involved limb, greater knee abduction angle was associated with greater medial CSA (ρ=0.64, p=0.04), while greater knee flexion angle was associated with lesser lateral CSA (ρ=-0.66, p=0.04) and thickness (ρ=-0.67, p=0.03). For the contralateral limb, greater knee abduction was associated with greater medial CSA(ρ=0.75, p=0.011) and thickness(ρ=0.77, p=0.01), as well as greater knee flexion angle associated with greater middle CSA(ρ=0.65, p=0.03), middle thickness(ρ=0.68, p=0.03), and lateral thickness(ρ=0.73, p=0.02). Previous literature has reported individuals with KOA within 20 years of ACLR also demonstrated greater involved limb knee flexion angles during gait. Knee flexion angle may be an important contributor to knee articular cartilage changes related to KOA development during early recovery after ACLR.

THE TEST-RETEST RELIABILITY OF THE BLOOD FLOW RESPONSE TO EXERCISE

Eric McElrath, Kadeeja Murrell
Kinesiology, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 681
Mentor(s): Katharine Currie (KINESIOLOGY)

Lower-limb cycling increases blood flow through the brachial artery, and this blood flow stimulus is necessary to improve arterial health. However, not all individuals experience improved brachial artery health following exercise training, which may be due to an inconsistent blood flow stimulus. It is unknown whether blood flow responses are consistent between recurring exercise bouts. Therefore, the purpose of this study was to assess the test-retest reliability of brachial artery blood flow responses during a standardized lower-limb exercise bout. Healthy males and females aged 18 years or older were recruited to perform two exercise sessions, each one week apart, at the same time of day. Each exercise session involved 30-minutes of cycling at 65% of their age-predicted maximum heart rate. During each visit, duplex ultrasound was used to measure 30 second samples of brachial artery diameters and blood velocity signals in their right arm while at rest, and at three time points during exercise (i.e., minutes 8, 18, and 28). Data collection and analysis is currently ongoing. Brachial artery diameters and velocities will be analyzed using a specialized software program, and brachial artery blood flow will be calculated. The reliability of blood flow at each time point, the average blood flow during exercise, and the change in blood flow from rest to exercise will be assessed using intra-class correlation coefficients. Findings from this study will be helpful in understanding the individual responses to exercise and exercise training.

CREATING A 'MODEL TASK' FOR MEASURING MOTOR LEARNING

Carson Doherty, Hannah Johnson, Kelly Pierce, Molly Donovan
Kinesiology, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 682
Mentor(s): Rajiv Ranganathan (KINESIOLOGY)

Whether it is playing a sport or a musical instrument, learning new motor skills is critical across the lifespan. Understanding the principles that facilitate motor learning is important because it provides insight not only for the acquisition of such skills but also for the rehabilitation of movement disorders such as stroke. However, one difficulty in trying to extract such principles is that prior studies show 'task fragmentation'—i.e., each lab typically uses a unique task which complicates comparisons of results across studies and minimizes replication of important findings. Additionally, many of these tasks require the use of expensive tools such as 3D motion capture systems which limit their use in labs that do not have such resources. Therefore, the goal of our study was to create and test a standardized 'model' motor learning task requiring minimal resources that could be replicated by labs all over the world. We used a task where college-aged adults threw a ball with their non-dominant hand to a target on the floor. Participants were asked to be as accurate as possible while aiming for a target 8.2 meters away. We measure task performance by quantifying the deviation from the target, and obtained a learning curve with practice. Moreover, we use video and free online software for detailed kinematic analysis of each participant. In this study we will explain how we developed a method of measuring motor learning that is simple, inexpensive, and employable by researchers around the world.

RANGE OF MOTION ANALYSIS OF THE INDEX FINGER AND THUMB WITH DAILY ACTIVITIES

Chris Sadler
Kinesiology, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 683
Mentor(s): Tamara Bush (MECHANICAL ENGINEERING)

According to the Centers for Disease Control and Prevention (CDC), by 2040 26% of U.S. adults 18 or older are projected to have physician-diagnosed arthritis of the hand. In even steeper numbers from the CDC, 49.6% of adults 65 and older have also reported having arthritis. With an increased number of people in a workforce full of technology, the use of one's hands has continued to be crucial to success. To measure this, the range of motion for one's hand can be studied through the mapping of index finger and thumb mobility with motion capture systems to determine hand functionality. For this study, Qualisys motion capture and MATLAB were used to determine the range of motion of one's hand while conducting various daily activities, specifically those that are related to technology (computer keyboard, cell phone, and computer mouse). The test subject's hand had reflective markers placed on key anatomical landmarks, and they were asked to perform these tasks while their motion data was being recorded. These data were then converted into rigid bodies and the movement of these bodies was identified within the functional hand space. This research has the goal to quantify ranges used during daily technology-based activities. It was found that keyboards required the most index mobility and cell phones required the most thumb mobility. With these data, we were able to not only quantify the ranges of motion necessary to accomplish these tasks, but also visually show these movements and compare across tasks. This will in turn allow the rehabilitation community to develop new techniques and exercises that will help promote this healthy range of motion.

EFFECTIVENESS OF IN VIVO EXPOSURE THERAPY ON DECREASING INJURY-RELATED FEAR IN PATIENTS POST ACL RECONSTRUCTION

Kellyann Gangaware
Kinesiology, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 684
Mentor(s): Shelby Baez (KINESIOLOGY)

Previous research has shown a relationship between self-reported fear and lower-extremity reaction time (RT). Rehabilitation specialists have addressed injury-related fear through in vivo exposure therapy (IVET), which exposes patients to fear-eliciting tasks. The aim of this study is to examine if IVET can improve lower-extremity RT in patients post-ACLR. A randomized controlled trial was used to examine the effectiveness of a 5-week IVET on individuals with a history of ACLR. Twelve female participants (age=22.5±4.6yrs, height=166.6±9.6cm, mass=67.2±9.7kg) with a history of ACLR (≥ 1-year post-operative) were randomized into an intervention group (n=6) or control group (n=6). Participants in the control group monitored their physical activity levels via a pedometer for 5-weeks. The independent variables were Group and Time and the dependent variable was lower-extremity RT using the Fitlight TrainerTM. A 2x2 repeated measures ANOVA was used to examine differences in lower-extremity RT. Partial η2 effect sizes were calculated to examine the magnitude of differences between Group and Time. Effect sizes were interpreted as small if between 0.01 and 0.08, medium if between 0.09 and 0.24, and large if >0.25. Individuals who underwent IVET did not exhibit statistically significant differences in lower-extremity RT when compared to the control group. However, a large effect size for Group was present (Partial η2 =0.29). No other clinically meaningful differences were observed. Interestingly, the control group exhibited faster RT than the intervention group. Physical activity monitoring may have encouraged control participants to increase physical activity levels, which may have led to increases in lower-extremity RT.

THE EFFECTIVENESS OF PARENTAL TUMMY TIME EDUCATION ON THE DURATION OF INFANT POSITIONING DEVICES (IPD) USE IN 6-MONTH OLD INFANTS

Nikki Dallas
Kinesiology, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 685
Mentor(s): Janet Hauck (KINESIOLOGY), Yuemei Lu (KINESIOLOGY)

Prone position, otherwise known as tummy time, is an important position for infants that promotes motor development and play. Sadly, infants often spend too much time constrained in infant positioning devices (IPDs) and not enough time in prone position. The purpose of this investigation is to determine if receiving tummy time parental education naturally reduces time spent in IPDs. Twenty-three infants participated in this intervention study (n = 13 intervention group; n = 10 control group). Starting at 1-month of age, infants in the intervention group received ongoing parental education on tummy time. Infants in the control group did not receive parental education or intervention. At 6-months of age, time spent in IPDs was collected over a 24-hour period using a parent reported log. T-tests were used to determine differences in IPD use between groups. Intervention infants (who received education on the importance of tummy time and were enrolled in a tummy time intervention) spent significantly fewer minutes constrained in an IPD than infants who did not receive education or intervention (t = 2.899, p = .009, ES = 1.18). Providing tummy time education was effective in reducing time spent in IPDs in 6-month old infants, compared to infants whose parents didn't receive tummy time education. This could mean that pediatricians can simplify their patient council of infant positioning to just the promotion of tummy time.

SLEEP AND PHYSICAL ACTIVITY IN CHILDREN WITH AUTISM AND TYPICALLY DEVELOPING CHILDREN

Courtney Casper
Kinesiology, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 686

Mentor(s): Janet Hauck (KINESIOLOGY)

Adequate sleep is crucial for humans to function optimally. Unfortunately, the prevalence of sleep disturbances in children with autism appear to occur at much higher rates than in typically developing children. However some studies indicate that physical activity is associated with better sleep. This study investigates the difference in sleep behaviors between children with autism spectrum disorder (ASD) and typically developing children (TD). Data from hip worn accelerometers was collected over 7 days and a MANOVA was used to compare sleep variables between children with ASD and TD. Physical activity is also tracked and compared to sleep variables. For this study, 22 Children with ASD were compared with 22 TD children aged 3 - 10. Data was processed using Sadeh algorithms to produce average daily sleep quality variables. Physical activity data was reduced using age specific cut points. We used a regression to investigate the relationship between MVPA and total sleep time. We also investigated differences between the two groups and their sleep quality. We found a relationship between MVPA and sleep time as well as children differences in sleep quality between the two groups. This data adds depth to the understanding of how children with ASD sleep and which components are the most difficult. Also, raises the possibility of using physical activity to help with sleep issues. Compared to TD children, children with ASD showed decreased sleep efficiency across many variables.

FREE-LIVING COMPARISON OF TWO GENERATIONS OF HIP-WORN TRIAXIAL ACCELEROMETERS IN COLLEGE-AGED ADULTS

Katie McKee
Kinesiology, Oral Presentation
Section: 5, 1:30 PM
Presentation Number: 948
Mentor(s): Karin Pfeiffer (KINESIOLOGY)

Accelerometers are frequently used to characterize habitual physical activity, but cross-generational comparability of newer models has not been verified. To ensure comparability among physical activity studies using different models of accelerometers, it is necessary to perform cross-generational comparability studies of newer accelerometer devices. Therefore, the purpose of this study was to compare count- and acceleration-based metrics and activity intensity classifications between two accelerometer models in free-living adults. Participants (N=70) wore two triaxial accelerometers (wGT3X-BT, GT9X) positioned at the hip for four days. Vector magnitude (VM) counts, total counts/min in each axis, VM acceleration, mean acceleration, Mean Amplitude Deviation (MAD), and Euclidean Norm Minus One (ENMO) were calculated in 60-s epochs. Activity intensity of each epoch was classified using VM counts, MAD, and ENMO-based cut-points to determine percent of time spent in each activity intensity and were compared via equivalence testing. At the epoch level, correlation coefficients (Pearson's r) were calculated for continuous variables, while weighted Kappa was used to assess agreement for activity intensity classification ($p<0.05$). Correlations ranged from 0.91 to 0.99 (VM) for count-based metrics, and from 0.45 (mediolateral acceleration) to 0.97 (MAD) for acceleration-based metrics. Weighted Kappa ranged from 0.71 (ENMO) to 0.93 (VM counts). Monitors were equivalent for all outcomes ($p<0.05$), except ENMO and percent of time spent in sedentary-to-light and moderate intensity activity as classified by ENMO-based cut-points ($p>0.05$). Previous research has demonstrated similar findings regarding count-based metrics. However, monitor output was not equivalent for ENMO-related outcomes, warranting caution when comparing this outcome between accelerometer models.

ACUTE CARDIOMETABOLIC RESPONSES TO VARIOUS MODES OF HIGH-INTENSITY INTERVAL EXERCISE IN GIRLS

Emily Makowski
Kinesiology, Oral Presentation
Section: 5, 1:45 PM
Presentation Number: 949
Mentor(s): Jeanette Ricci (KINESIOLOGY), Karin Pfeiffer (KINESIOLOGY)

In children, there is widespread utilization of laboratory treadmills or cycle ergometers to investigate acute cardiometabolic responses to high-intensity interval exercise (HIIE). However, little is known regarding girls' responses to field-based modes of HIIE. The aim of the study was to examine the acute cardiometabolic responses in girls performing treadmill-based HIIE (TM) and a body-weight resistance exercise circuit (CIRC). Nineteen active girls (age = 9.1±1.1 yr, m±sd) engaged in a graded treadmill test to determine peak oxygen consumption (VO2peak), peak heart rate (HRpeak), and maximal aerobic speed (MAS). Subsequently, participants completed CIRC and TM on separate occasions. CIRC consisted of two sets of four exercises performed 'all out' for 30s each followed by 30s of active recovery. Time-matched TM consisted of 8 bouts of 30s running at 100% MAS followed by 30s of walking at 40% MAS. VO2 and HR were assessed continuously, and blood lactate concentration (BLa) was measured pre- and post-exercise. Cardiometabolic responses between protocols were compared using paired samples t tests. Mean peak HR responses (i.e., the last 10 seconds of each work interval) were similar between TM (88 ± 4 %HRpeak) and CIRC (90 ± 6 %HRpeak) (P=0.19). Similarly, there were no significant differences in mean peak VO2 (TM=78 ± 11 %VO2peak and CIRC=79 ± 11 %VO2peak, P=0.60). BLa was significantly higher at post-exercise following CIRC vs TM (mean difference = 4.4 ± 1.4 mmoL, P<0.01). Conclusion: Body-weight resistance exercise elicited responses that are representative of HIIE and may provide a field-based alternative to treadmill-based HIIE in youth.

SHOULD WE STRUGGLE FOR SUCCESS? USING ADAPTIVE PRACTICE TO OPTIMIZE MOTOR LEARNING

Logan Ben-Ezra
Kinesiology, Oral Presentation
Section: 5, 2:00 PM
Presentation Number: 950
Mentor(s): Mei Hua Lee (KINESIOLOGY), Priya Patel (KINESIOLOGY), Amy Francesca Bellito (EXTERNAL MENTOR)

When learning a new motor skill, it is often debated whether facing a challenge is advantageous to learning or not. Challenging the learner with a high difficulty level can be beneficial for learning, but a high level of difficulty can also increase the chances of experiencing failure, which can decrease motivation to continue learning. One way to address this dilemma is through the use of 'adaptive' practice schedules that can be tailored to the learner's ability. These schedules involve a combination of both high-difficulty and low-difficulty tasks to maximize learning while also keeping motivation levels high. However, what proportion of high-difficulty tasks is optimal for motor learning is not known. The aim of this study is to investigate different proportions of adaptive practice that optimizes motor learning. Here we used a customized body machine interface (BoMI) to develop a virtual reaching task in which participants reached for target circles on computer screen using body movements. College aged adults learned this task through 160 practice trials using four proportions of adaptive practice sessions (100%, 75%, 50%, and 25%). In adaptive practice sessions, targets were repeated after high error to produce a more challenging session, while in remaining sessions targets were presented in random order. We expect that the group with 25% adaptive practice sessions will outperform other groups in terms of performance and

learning of this novel task. This study findings will provide insight in the use of adaptive practice schedules to optimize motor learning in domains like movement rehabilitation.

PHYSIOLOGIC EVALUATION OF A COLLEGIATE MASCOT DURING FOOTBALL GAMES AND RELATED ACTIVITIES

Alyssa Guadagni
Kinesiology, Oral Presentation
Section: 5, 2:15 PM
Presentation Number: 951
Mentor(s): Ashley Triplett (KINESIOLOGY), Emily Werner (KINESIOLOGY), James Pivarnik (KINESIOLOGY), Sue Petrisin (MSU ALUMNI OFFICE)

Heart rate (HR) monitoring and accelerometry have been used to evaluate collegiate athletes' activity levels during practice and competition. An important, yet understudied group that also exerts substantial effort during collegiate sporting events are team mascots. Our purpose was to collect collegiate mascot movement data and determine HR responses during two football games and pregame-related activities. A physiological tracking system was used to evaluate HR and movement from individuals (N=7; N=1 female; avg ht=1.82m, wt=75.6kg) who performed mascot activities "in suit" (weighing ~14kg) before and during two NCAA Division I University football games. Both games were played at night under moderate ambient conditions (temp=22-14°C, rh=64%, wind speed=4mph). Prior to the study, individuals' HRmax values were determined during graded treadmill tests performed to volitional exhaustion. Variables game variables analyzed were time in suit, time in pre-established HR zones [HRzone1 (50-59%HRmax), HRzone2 (60-69%HRmax), HRzone3 (70-79%HRmax), HRzone4 (80-90%HRmax), and HRzone5 (>90%HRmax)], and distance covered per minute. Differences in time per HRzone were evaluated using 95% confidence intervals. Differences in average HR between pre-game and game conditions were evaluated via t-test. Sessions in suit lasted 43.5±10.5min, and distance traveled was 47±22m/min. HR averaged 82±8% of HRmax, with over half the time spent in HRzone4 (34±20%; $p<0.05$) and HRzone5 (23±27%), with only 2±2% spent in HRzone1. HR was significantly lower during pregame (74±4%HRmax) compared to game (85±6%HRmax) activities ($p<0.001$). The suit environment posed significant physiological strain on the mascot, despite relatively little activity or movement performed.

LINGUISTICS, LANGUAGES, & SPEECH

VISUAL ANALYSIS OF GLOTTAL ATTACK AND OFFSET TIMES IN NORM AND DISORDER USING HIGH-SPEED VIDEOENDOSCOPY

Rena Ju
Linguistics, Languages, and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 123
Mentor(s): Maryam Naghibolhosseini (COMMUNICATIVE SCIENCES AND DISORDERS)

Spasmodic dysphonia disrupts laryngeal muscle control during speech, which could affect the onset and offset of phonation. In this study, high-speed videoendoscopy (HSV) was used to calculate the glottal attack and offset times during connected speech for vocally normal adult participants and adults with adductor spasmodic dysphonia (AdSD). A monochrome HSV system was used to record prolonged vowel, sentence reading, and readings of the "Rainbow Passage" from vocally normal adults and adults with AdSD. This is preliminary analysis, so the subject pool consists of four females - two with AdSD and two norms. Two raters visually analyzed the HSV data to cross-compare, using a playback software (PFV4 Photron FASTCAM Viewer, Photron USA, Inc., San Diego, CA) with a playback speed of 30 frames per

second to measure the durations of glottal attack and offset times. The timestamps from the first oscillation to the last contact and from the last contact to the last oscillation of the vocal folds were determined by the raters and considered as the glottal attack and offset times for each participant. The measurements performed by the two raters were successful and in agreement.

THE EFFECTS OF LEBANESE ARABIC ON ALVEOLAR STOPS IN MICHIGAN ENGLISH

Sean Connelly

Linguistics, Languages, and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 124
Mentor(s): Chad Hall (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Karthik Durvasula (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

In communities where a majority of the population have strong ties to a foreign culture and language, such as through immigration, multilingualism/multidialectism often emerges over time as the population adjusts to the local language. As a result, it is possible for children who are raised in close proximity to the foreign heritage language of their family to adopt certain features of the heritage language while natively learning the local language of their peers. In this project, I examined whether this is the case for children raised in Dearborn, Michigan, a community with a significant Lebanese-American population. Specifically, Lebanese-Arabic English appears to have dental stops (/t/ and /d/), which would typically be realized as alveolar stops among native Michigan English speakers with no heritage language. Word list recordings collected through the research of Bakos (2006), as well as through this project, were analyzed in PRAAT to examine the potential differences in formant values, centroid frequency, and voice onset time which could establish this contrast between the two speech groups. In this presentation, I will discuss the linguistic justification for the measurement criteria, as well as the degree to which heritage Lebanese Arabic affects the alveolar stops of standard Michigan English.

DEFAULT FEATURES AND THE THEORY OF PHONOLOGICAL UNDERSPECIFICATION

Megan Placko

Linguistics, Languages, and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 125
Mentor(s): Karthik Durvasula (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

Previous studies have shown that the mental representation of phonemes consists of a bundle of the minimal set of features that can be used to distinguish one sound from another. According to the theory of Phonological Underspecification, when a feature has two variants, such as voiced or voiceless, one feature may be considered a "default" while the other is the "marked" variant. It has been shown using Electroencephalography that in the case of voicing the voiced variant is the default. Therefore, the minimal set of features doesn't need to include a specification if the sound is voiced, but it does if the sound is voiceless. This would produce an asymmetric representation of the two variants in the mind of the individual since the complete set of features used to describe the voiced variant would be included in the features of the voiceless variant in addition to the voiceless feature. The goal of this project is to test whether there is an asymmetric mental representation closer to the level of awareness. In this experiment, using an oddball paradigm, participants are primed with the default stimulus, then one marked stimulus is played along with the reverse order (primed with the marked stimulus and one default is played). Then, the reaction times for the two variants are compared. This project will contribute to the understanding of the cognitive processing of speech sounds.

WHO ARE WE FOCUSING ON? THE INTERPRETATION OF FOCUSED SUBJECTS IN SPANISH

Daniel Greeson, Matthew R. Miller, Megan Placko
Linguistics, Languages, and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 126
Mentor(s): Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

In Spanish, a third-person person pronoun like 'él' (he) could, in theory, refer to any male in the world. Despite this potential ambiguity, there is a tendency for fully pronounced subject pronouns like 'él' to refer to someone different than the referent of the previous subject, i.e. refer to someone new. However, several studies show that when a pronoun is emphasized/focused, the preferred interpretation switches back to the same referent as the previous clause. This project aims to study this effect using word order as a proxy for emphasis, since according to Zubizarreta (1998), focused pronouns move to a postverbal position. We are analyzing a corpus of transcripts of mother-child interactions in order to investigate whether subject-verb order is affected by the referential status of the subject (i.e. reference to the same person as the previous subject or not). We will analyze both adults' and children's production in Mexican and Paraguayan Spanish. This allows us to determine to what extent children are following the same patterns as their parents. In addition, the results will contribute to a description of Paraguayan Spanish, a variety of Spanish that has not been well-studied, and which differs quite a bit from other more standard varieties in pronoun realization, as we will show through comparison with Mexican Spanish.

COMPUTATIONAL TURKISH

Kinsey Adair
Linguistics, Languages, and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 127
Mentor(s): Karthik Durvasula (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

The main idea behind computational mathematics in the non-computer science world is having a theoretical generalization that can apply to all rules of languages. Similar to the ideas behind abstract algebra, we want to create a function that can generate grammars that define a language. In order to do this, we use a concept proposed in Thomas Graf's book titled Computational Linguistics as Language Science. The book ultimately walks the reader through purposes and processes that can apply to languages on an abstract level. Graf combines a mathematical and linguistic approach, along with a little bit of computer science and programming, to create these functions. This paper will examine the first half of Graf's book, which focuses on phonological generalization concepts, and will briefly describe these concepts, specifically n-gram functions, strictly local languages, and piecewise functions. We then use these definitions and show they are universal to all languages. We examine the phonological rules in Turkish and use the concepts presented by Graf to analyze these rules. We want to show that we can choose an abstract function for each phonological rule and together these functions describe the entire Turkish language, according to the phonology of Turkish.

INVESTIGATING THE USE OF DISTAL PROSODY IN SPEECH SEGMENTATION IN CHILDREN

Nicole Boog, Shubhangi Sharma
Linguistics, Languages, and Speech, Poster Presentation

Section: 1, 9:00 - 10:30 AM
Presentation Number: 128
Mentor(s): Carrie Kroger (PSYCHOLOGY), J McAuley (PSYCHOLOGY)

Individuals learning a spoken language must be able to map portions of continuous speech into meaningful units (e.g., words). Dilley & McAuley (2008) proposed a perceptual-grouping hypothesis whereby distal prosodic cues, patterns of intonation temporally removed from a target region, create expectations about the grouping of later syllables into words. Support for this hypothesis comes from research with adults but has not been shown in children. Children ages 6-8 (n=22) studied twelve disyllabic target 'code' words in an artificial 'alien' language, then monitored utterances for code words that were congruent or incongruent with the distal prosody. Congruent items matched the intonation at the beginning of the utterance, but incongruent items did not. Participants rated how well they heard the 'code' words on a scale from 1-6 (1 = "I did not hear the code word," 6 = "I heard the code word very well"). Half of the trials had a code word present in the utterance, while the other half did not. Local prosody of targets was held constant between congruent and incongruent contexts and only the distal prosody was different. Results indicated that children distinguished between target word present and absent conditions. Congruent words were rated higher (better perceived) than incongruent words indicating that code words matching the prosodic pattern at the beginning of an utterance were better perceived than code words incongruent with it. These findings support the perceptual grouping hypothesis and suggest that, like adults, children ages 6-8 use distal prosodic context to group syllables into words.

EXAMINING CONSISTENCY IN PARENT VOCABULARY CHECKLISTS IN YOUNG CHILDREN WITH AUTISM

Ellen Brooks, Monica Holland
Linguistics, Languages, and Speech, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 129
Mentor(s): Alex Hanania (COMMUNICATIVE SCIENCES AND DISORDERS), Courtney Venker (COMMUNICATIVE SCIENCES AND DISORDERS)

Parent report measures are commonly used to measure early vocabulary knowledge in children autism spectrum disorder (ASD) in both clinical and research settings. These measures are efficient and ecologically valid, but it may be difficult for parents to accurately and reliably judge their child's knowledge of individual words. This project addressed two research questions. First, how consistent are parents of children with ASD in reporting their children's vocabulary knowledge? Second, is there an association between parents' consistency in reporting their child's vocabulary knowledge, and their own certainty about these judgments? We addressed these questions by comparing parent report for the same words across two separate vocabulary checklists and by gathering certainty ratings for individual words. Participants were 19 children with autism (2-5 years old). Consistency ranged from 52% to 100% across parents, indicating a vast amount of variability across parents. There was a significant, positive correlation between parent certainty ratings and parent consistency. Parents who rated their responses as more certain also showed higher consistency in their responses across the two checklists ($r = .56$, $p = .013$). Research is needed to determine whether parent certainty ratings provide meaningful information about emerging vocabulary knowledge in children with ASD.

WEIGHTED STUTTERING DISFLUENCY MEASURE DIFFERENTIATES AMBIGUOUS CASES OF STUTTERING

Kelsey Russell, Raywa Masti
Linguistics, Languages, and Speech, Poster Presentation

Section: 1, 9:00 - 10:30 AM
Presentation Number: 130
Mentor(s): Megan Sheppard (RADIOLOGY), Soo-Eun Chang (COMMUNICATIVE SCIENCES AND DISORDERS)

Stuttering is a neurodevelopmental disorder occurring in 5-8% of preschool-aged children, characterized by "stuttering-like disfluencies (SLDs)" (e.g., part-and whole-word repetitions, sound prolongations/blocks). Typically, a child is identified as stuttering if the frequency of SLDs in speech exceeds 3%. In some cases, however, children exhibit ambiguous %SLD scores (e.g., 2-4% SLD), making it difficult to determine stuttering status. Another measure of stuttering is the weighted SLD (WTSLD), which puts more weight on those stuttered instances with higher repetition units and longer duration of prolonged sounds. Here we tested whether WTSLD would better predict the stuttering status of children with ambiguous %SLDs. %SLD and WTSLD scores were calculated from spontaneous speech samples of 51 children who do (n= 39; 21 female; M age= 5.56 years; Age range=3.1-9.5 years) and do not stutter (N=12; 4 female; M age= 4.23 years months; Age range= 3.25-5.33 years). Both stuttering and non-stuttering groups exhibited %SLD scores in the 2-4% range. We found that %SLD was not significantly different between children who do (M=2.89, SD= .79) and do not stutter (M= 3.06, SD=.79; t(41)= .615 , p>.025; g=.21). Children who stutter (M= 3.84, SD=1.13) had significantly higher WTSLD scores as compared to children who did not stutter (M=2.93, SD=.79; U= 90.50, p<.025; g=.87). These preliminary results indicate that WTSLD may be a more reliable diagnostic tool than %SLD, especially in identifying children with lower frequencies of SLDs in their speech.

COMMUNICATION AND SWALLOWING DISORDERS IN MULTIPLE SCLEROSIS: THE ROLE OF THE SPEECH-LANGUAGE PATHOLOGIST IN DEGENERATIVE NEUROLOGICAL CONDITIONS

Alyssa Drost
Linguistics, Languages, and Speech, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 291
Mentor(s): Matthew Phillips (COMMUNICATIVE SCIENCES AND DISORDERS)

Multiple Sclerosis is a neurodegenerative disease in which there is an abnormal response of the body's immune system to attack the central nervous system. In this disease, the myelin sheath protecting nerve fibers is damaged by inflammation and eventually damaging the nerve fibers. Damaging the nerve fibers causes signals to the central nervous system to be stopped or altered. There are a plethora of possible neurological symptoms that could occur, including dysarthria, dysphonia, or dysphagia. These speech, voice, and swallowing disorders will require intervention by a speech pathologist to improve the symptoms presenting. The right approach to intervention for an individual with multiple sclerosis is a question that requires an answer. For a disease in which the disorders can never be completely overcome, what types of intervention can a speech pathologist provide to better the quality of life of someone with multiple sclerosis? When should certain interventions be implemented? This research is important because being able to communicate is imperative. Individuals with multiple sclerosis deserve the best quality of life that individuals such as speech pathologists can give them with the help of therapy.

EYE-GAZE METRICS OF CLINICIANS VIEWING VFSS AS A FUNCTION OF BOLUS CONSISTENCY

Alyssa Fritz, Claire Netemeyer, Madeline Brender
Linguistics, Languages, and Speech, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 292

Mentor(s): Chelsea Ozuch (COMMUNICATIVE SCIENCES AND DISORDERS), Jeffrey Searl (COMMUNICATIVE SCIENCES AND DISORDERS)

Speech-language pathologists have primary responsibilities for diagnosing swallowing disorders. A radiographic procedure called a VFSS (or MBS) is the most commonly used method of observing one's swallow, but clinicians demonstrate low levels of agreement when making judgments from the exam. How a clinician visually scans the VFSS is understudied, but might help explain disagreements in clinical judgment. The purpose of this study was to identify areas of interest (AOI) in VFSS images and use eye-tracking software to evaluate the duration of time a subject spent looking in one location, which will be analyzed through eye-gaze metrics (fixation count). Participants were 12 novice SLPs (1st year graduate students) and 13 experienced clinicians (licensed SLPs working in a hospital). They viewed a VFSS exam on one patient swallowing several boluses consisting of thin liquids, nectar, honey, pudding, and a solid (not reported here). A Tobii Pro X3-120 monitor mounted eye tracker and TOBII Pro Lab software tracked the participant's eye-gaze. Measures of interest were: 1) time to first fixation and 2) location of first fixation. Results will be reported as descriptive statistics for each measure by participant group, t-test for independent measures to compare time to first fixation for the two subject groups, and a Chi square test for a 2 (group) x 4 (AOI) contingency table. Findings from this study will provide initial data about how clinicians view VFSS and ultimately can contribute to developing or refining clinical training approaches to evaluating VFSS.

CLITICS AND DEMONSTRATIVES IN PARAGUAYAN SPANISH

Anthony Delsanter, Katelyn Weatherford, Zander Rose
Linguistics, Languages, and Speech, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 293
Mentor(s): Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

In standard varieties of Spanish, the pronominal element LE is almost exclusively used for indirect objects, and the series with gender and number LO(s) and LA(s) is used for direct objects (in Buenos Aires Spanish, for example). In other varieties (LEísta dialects), the pronominal LE is used more widely for both indirect and various types of direct objects. In some LEísta varieties, LE is used only for masculine animates, and in others for masculine inanimates as well. Researchers explain the use of LE for masculine as some sort of inheritance from Latin demonstratives and perhaps as an analogy to the distribution of demonstrative pronouns in contemporary Spanish. In Spanish 'this' has three forms: ESTE for masculine, ESTA for feminine and ESTO for 'neuter'. In this study we compare the use of demonstratives to the use of the direct object pronouns in Paraguayan children living in Argentina (who are exposed to both a LEísta and a non-LEísta dialects) in order to determine to what extent the distribution of demonstratives and clitics correlates.

VOCAL EFFORT DUE TO CHANGING COMMUNICATION GOALS AND VOCAL HEALTH SURVEYS

Becky Clawson, Megan Buckley
Linguistics, Languages, and Speech, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 294
Mentor(s): Eric Hunter (COMMUNICATION ARTS AND SCIENCES), Mark Berardi (COMMUNICATIVE SCIENCES AND DISORDERS)

Persons facing voice problems commonly experience elevated vocal effort depending on the severity of the voice problem and the communication task. Vocal effort also may change due to communication environment (e.g. speaking to a close friend in a quiet room, speaking in a

loud restaurant to a group of people). In this study, participants self-rated vocal effort level during a variety of controlled communication goals and situations. The participants described routes on a subway map in the presence of varying levels of background noise levels (53, 62, 71 dBA), the listener moving 1, 2, and 4 meters away from the talker, and varying speech loudness targets (54, 60, 66 dBA). Participants completed clinical surveys on vocal health (Vocal Handicap Index; VHI-10 and Vocal Fatigue Index) prior to the speaking tasks. Presented will be the connection between participant's survey scores and their perceived vocal effort level.

INTERPRETATIONS OF THE PRESENT PERFECT IN THE PRESENCE OF ADVERBS

Ian Schneider, Jordyn Gerdes, Lexie Hampton, Sophie Cook
Linguistics, Languages, and Speech, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 295
Mentor(s): Alan Munn (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

Every day, likely without even noticing, small changes cause you to interpret the present perfect differently. If you were to say "I have been busy", you could have meant two things: you have been during a past intercal, or you have been busy from some point till now. If you add an adverbial phrase, e.g. "I have been busy since Monday", the preferred interpretation becomes that of being busy from Monday to now. While the first interpretation is ambiguous as to the interval of the activity, the second creates a defined interval of activity stretching back from the present to a specified reference point. Our experiment is designed to question if the presence of adverbials eliminates the ambiguity of this first interpretation, only allowing the definite interpretation. In order to determine this, we have designed a questionnaire of contextual sentences that contain either no adverb or a adverbial phrase. After presented with the context and the following sentence, the subject will be asked whether the event in question is happening presently or not. The contexts are designed to place the event at a specific point in time, even if the sentence by itself would have been ambiguous. Our preliminary research has led us to believe that sentences that do not contain an adverbial could be interpreted in either way, depending on the context. Sentences with adverbs should eliminate the ability for the subject to interpret the sentence ambiguous and only leave a definite interpretation of the interval.

DO YOU KNOW HOW TO INTERPRET "LOWKEY", LOWKEY?

Ian Schneider, Jordyn Gerdes, Kellie Zhou, Lexie Hampton, Sophie Cook, Vivian Nguyen
Linguistics, Languages, and Speech, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 296
Mentor(s): Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

Lowkey can be used as an adjective or an adverb. In a scenario in which your friend Sam leaves his lunch uneaten and his friend is left to explain why he did not eat his sandwich he can say: "Sam lowkey hates tuna" but he could also say "His hate for tuna is lowkey". In the first case it is used as an adverb and in the second case as an adjective. What are the differences in interpretation between the adverbial and the adjectival uses of lowkey? And what are the contexts in which they are appropriate? Are there contexts in which the interpretation is constrained? In some contexts it can mean that someone is either positive about something (but is not vocal about it) or is neutral about something. In this project we examine the interpretation of lowkey and the contexts in which it is appropriate to use it. Using a forced-choice task (ok or not ok) we test sentences with lowkey against different

contexts and we examine in two different experiments the effects of context and the possible interpretations.

FACTORS AFFECTING SPEECH RECOGNITION IN DIFFICULT LISTENING CONDITIONS: SUPPORT FOR A SELECTIVE ENTRAINMENT HYPOTHESIS

Anusha Mamidipaka, Becca Vroegop, Nicole Boog
Linguistics, Languages, and Speech, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 297
Mentor(s): Alison Eberle (PSYCHOLOGY), J McAuley (PSYCHOLOGY)

Difficulty understanding speech amidst background sounds is a commonly encountered problem, with the reported difficulties only worsening with increased age. The present study used the Coordinate Response Measure paradigm (Bolia et al., 2002) to investigate the role of speech rhythm in understanding speech in difficult listening conditions. 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 male talker who spoke the call sign "Baron." In Experiment 1, the target speaker was presented with white noise and either a one-talker female or male background. For the male background talker, increasing the rhythmic irregularity of the target speech decreased target recognition, while increasing the rhythmic irregularity of the background improved target recognition. For the female background talker, a target rhythm effect was observed, but not a background rhythm effect. In Experiment 2, the target speaker was presented with one-talker male noise-vocoded speech in the background; this manipulation preserved the speech rhythm of the background, but eliminated the semantic content. Although a target rhythm effect appeared, as in Experiment 1, there was no background rhythm effect. Overall, the results support a selective entrainment hypothesis by showing that both the target and background talker rhythm play an important role in speech-in-noise understanding, but that (1) the background rhythm effect depends on the semantic content of the background and (2) listeners use talker fundamental frequency to perceptually segregate targets from background separate from their use of speech rhythm.

COMPARING CHILDREN'S EARLY WRITING IN CHILE AND IN THE UNITED STATES

Madison Brodoski
Linguistics, Languages, and Speech, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 477
Mentor(s): Hope Gerde (HUMAN DEVELOPMENT AND FAMILY STUDIES)

The English and the Spanish languages are similar in that they are both written and read from left to right and both use the Roman alphabet, which helps to build a phonemic and phonological foundation. Despite this, the two languages differ in orthography in which English is opaque and Spanish is transparent. As a result of language-based variation, writing development may proceed differently for monolingual children learning each language. This study describes and compares the early writing skills of Chilean and USA children at the beginning of the school year in prekindergarten. Fifty monolingual Spanish-speaking children from Chile and 163 English-speaking children from the USA completed a comprehensive assessment of early writing including name writing, letter writing, word writing, and a novel story writing, coded for both transcription (i.e., spelling, handwriting) and composing (e.g., alignment to theme, complexity). The assessment was translated, adapted (i.e., for orthographic and cultural differences), and piloted in Chile prior to administration. Descriptive analyses indicate that pre-kindergarten children in both Chile and the US vary widely in their verbal and written outputs. However, children from both nations perform similarly on an innovative measure of early composing including in their verbal and written outputs. Results

suggest that the measure accurately elicits early writing from children and that language differences may not be reflected in children's early composing skills.

THE EFFECTS OF MOTION ON THE COMPREHENSION OF FAMILIAR WORDS AND OBJECTS IN CHILDREN WITH AUTISM SPECTRUM DISORDER

Carly Clark, Megan Nylund, Olivia Roberts
Linguistics, Languages, and Speech, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 478
Mentor(s): Courtney Venker (COMMUNICATIVE SCIENCES AND DISORDERS)

Language comprehension in children with Autism Spectrum Disorder (ASD) is often difficult to assess; however, screen-based measures of receptive language offer a valuable alternative to traditional assessments. During the screen-based tasks, children are presented with two familiar images, one of which is labeled (e.g. Find the ball). In half of the trials, the named image wiggled after being labeled. We examined comprehension by coding the amount of time a child focused on the target image. We predicted that movement would increase children's attention to the task. Our preliminary results indicate that attention to the target image increased significantly when the image moved. This research helps to expand our knowledge on the use of screen-based measures for assessing receptive language in children with ASD.

SCOTTISH ENGLISH DERHOTICIZATION AND VOWEL INSERTION

Jillian Burger
Linguistics, Languages, and Speech, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 479
Mentor(s): Kaylin Smith (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

A process of vowel insertion exists in Scottish English words ending in liquid+liquid (e.g. /rl/) and liquid+nasal (e.g. /rm/, /lm/, /rn/, /ln/) coda clusters (e.g. hurl pronounced as hurrul). Previous reports refer to this process as vowel epenthesis-- a phonological process often used to repair dispreferred sequences of phonemes. Despite this classification, no formal phonological analysis has been put forth to determine whether the process is phonological-- and therefore intended by the speaker-- or merely the result of coarticulation. One criterion for classifying a process as phonological is the ability to interact with other processes. Given that Scottish English has been undergoing a phonological process of derhoticization, in which rhotics (i.e. all of the allophones of R) become acoustically weakened in word-final coda positions, we investigate whether vowel insertion interacts with derhoticization. Three native Scottish English speakers were recorded while reading aloud from a wordlist. Target words contained /rl/, /rm/, /rn/ clusters situated within (e.g., farm) and across syllable boundaries (e.g., farming). Data analysis will include significance testing to determine whether fewer vowels are inserted when "R" is derhoticized, since the dispreferred cluster will have been simplified (e.g. farm pronounced as faam), blocking the vowel insertion repair. If the number of vowels inserted in words with derhoticized "R" is significantly different from words containing fully rhotic pronunciations, the process will align more with a phonological classification. Determining the status of the inserted vowel via its interaction with derhoticization will contribute to the phonology of Scottish English and phonological vowel epenthesis.

TO INFINITIVE AND BEYOND: SYNTACTIC BOOTSTRAPPING AND THE INFINITIVAL PERFECT

Hollie Nusbaum, Jett Hampton
Linguistics, Languages, and Speech, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 480
Mentor(s): Alan Munn (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Darby Grachek (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

Syntactic bootstrapping has been shown to be an effective strategy used by children for understanding the meaning of verbs they don't know. Hacquard and Lidz (2018) showed that children use the syntactic structure of different types of sentences to predict the meaning of an unfamiliar verb. One sentence structure that hasn't been previously examined is the infinitive with or without the perfect tense. Crucially, these different types of infinitive sentences are only grammatical with certain types of verbs. Both belief-type verbs (think, believe, etc.) and desire-type verbs (want, wish, etc.) are grammatical with the perfect, but the infinitival is only grammatical with belief-type verbs. For example, "I believe Mary to have eaten" and "I want Mary to have eaten" are both grammatical sentences because they use the infinitival perfect. The infinitival sentence with a desire-type verb "I want Mary to eat" is grammatical, however the same sentence structure with a belief type verb, "I believe Mary to eat" is not. Using the same narrative videos as Hacquard and Lidz (2018), we ask participants to answer questions involving nonsense verbs to see if they can predict the meaning of the verb (want or believe) simply by using the perfect tense inside the infinitive (to clause). If children are able to do this, it will provide evidence that they understand the effect of perfect tense, and that they are able to use this knowledge productively to infer whether there is a belief or desire-type verb in the sentence.

"I TALK WITH MY HANDS": GESTURES AND THEIR AT-ISSUE CONTRIBUTIONS

Abby Jaroszewicz, David Sherwood, Erin Marchert
Linguistics, Languages, and Speech, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 481
Mentor(s): Alan Munn (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

Literature from previous studies on gestures supports the claim that co-speech gestures make contributions that, by default, do not affect the truth of what is being said. There are differences, however, in whether the analyses allow for these contributions to be relevant to the truth of what is being discussed (at-issue) or not and the cost of incorporating the gestural information to the issues under discussion. Previous studies focused mainly on the contributions of gestures that convey spatial attributes, not conventional gestures, such as a "thumbs-up" for a job well done. In this study, we aim to gain a better understanding of the contribution gestures add to the information retained compared to spoken language only, as well as the contributions gained from spatial versus conventional gestures. We designed a between-subjects experiment testing participants' retention of three different variations of the same story: language only, language with gesture, and gesture only of spatial and conventional gestures. We hypothesize that if the gesture-only condition results in lower retention of the story, then it indicates that gestures do not make at-issue contributions. Additionally, if results from the gesture only condition show a higher retention of the information from spatial gestures in comparison to conventional, then it shows that spatial gestures are more likely to make at-issue contributions to spoken language. This research

aims to contribute a greater understanding of the significance that gestures play in language comprehension.

REVERSAL OF PRE-ORAL /Æ/ IN THE NORTHERN CITIES SHIFT IN LANSING

Michaela Smith

Linguistics, Languages, and Speech, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 482
Mentor(s): Karthik Durvasula (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Suzanne Wagner (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

The Northern Cities Shift (NCS) affected the vowels of primarily white American English speakers in the Great Lakes region including cities in Michigan such as Detroit, Grand Rapids, and Flint. Lansing is one of the cities where speakers exhibit the NCS; however, there has been recent evidence suggesting that a feature of the shift is reversing to its pre-NCS pronunciation (Nesbitt, 2019). Previously, /æ/ was raised in both pre-oral and pre-nasal contexts, but this new evidence shows that the pre-oral /æ/ may be reverting back to its unraised pronunciation. In this paper, I look into the reversal of this feature in speakers from Lansing, Michigan at two different age groups, both of white female participants, and compare not only their production of the /æ/ vowel but also their perception. One age group will be comprised of speakers from Lansing born during and before the 1960s, which means they should have the /æ/ raising in both pre-oral and pre-nasal contexts, while the other age group will be made up of students of Michigan State University from Lansing born during the 1990s. The /æ/ vowel will be auditorily compared between the two groups to see if there is additional evidence of a reversal of this feature, and their perception of the vowel will be measured to see if the participants are able to perceive the difference between raising.

YOU CAN USE 'OR' OR 'AND': A C'OR'PUS STUDY OF 'OR'

Ben Airola, Callista Lupa, Holly Langenstein

Linguistics, Languages, and Speech, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 483
Mentor(s): Alan Munn (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Rachel Stacey (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

The conjunction 'or' allows for two interpretations: exclusive (one or the other but not both), and inclusive (one or the other or maybe both). The basic meaning of 'or' is inclusive, and the exclusive 'or' is derived through an inference process. Past studies have shown children tend to allow the logical, or inclusive, interpretation of 'or,' but other studies have shown they are able to calculate these inferences and interpret 'or' as exclusive when given improved contexts. The inclusive interpretation of 'or' can be made more prominent in contexts such as free choice ("You can invite John or Bill") or negation ("I didn't see John or Bill"). Outside of such structures, the preferred interpretation of 'or' appears to be exclusive ("Yesterday, I played flute or clarinet"). A majority of the work done on this phenomenon has been experimental in an effort to determine children's abilities to interpret 'or' compared to adults, but thus far there has not been a comprehensive investigation into what contexts children hear and produce 'or.' This corpus study examines the usage of 'or' in child-directed speech. Our goal is to see to what extent 'or' is used in various sentence structures which may favor one interpretation over another. The rates of usage in the child-directed speech will improve our interpretations of future experimental work on the topic.

MEASURING THE EYE GAZES AND ORAL LANGUAGE SKILLS OF PRESCHOOL AND EARLY ELEMENTARY CHILDREN

Ashley Locklear, Jacob Richardson
Linguistics, Languages, and Speech, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 663
Mentor(s): Lori Skibbe (HUMAN DEVELOPMENT AND FAMILY STUDIES), Sarah Goodwin (HUMAN DEVELOPMENT AND FAMILY STUDIES)

Oral language skills support literacy and prepare children for educational settings (Zuckerman, 2009). Eye tracking, recording eye-movement patterns on a computer, has been used recently with young children to assess these important beginning literacy concepts, such as vocabulary recognition or attention to print (e.g., Rayner, Ardoin, & Binder, 2013; Thompson, Plavnick, & Skibbe, 2018). However, less is known about spoken language processing for children with speech and/or language impairment. The present study measures attention patterns on a computer-based assessment of phonological awareness, the ability to recognize and manipulate sounds and words (e.g., "What rhymes with cat?"). Our research seeks to uncover how children use the task: specifically whether children gaze more at provided picture responses than other screen contents. Participants (n=60) had, as defined by their Individualized Education Plan, either speech-language impairment (SLI) or SLI plus at least one other educational need (e.g., cognitive impairment). Using a Tobii X2-60 portable eye tracking unit, we measured gaze fixation duration to the three screen images. Results suggest that children did, as we anticipated, pay attention longest to the correct response. Moreover, children gazed at the choices in left-to-right patterns, similar to children with typical development (Skibbe, Thompson, & Plavnick, 2018). Findings indicate that young children, even those who do not use spoken language in typical ways, are able to engage with a measure of phonological awareness that allows us to measure their ability appropriately. Recommendations for future research and implications for practitioners will be provided.

FIRST LANGUAGE ACQUISITION OF DEMONSTRATIVES IN ENGLISH AND SPANISH

Anthony Delsanter, Katelyn Weatherford, Zander Rose
Linguistics, Languages, and Speech, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 664
Mentor(s): Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

Demonstratives are linguistic elements whose interpretations make crucial interpretations about some aspect of speech in a given situation (Diessel 1999). We can think of demonstratives as strong or weak depending on how strong they encode information about the speaker's position in relation to what is referred to by the demonstrative ('this' is close to the speaker and 'that' is far from the speaker in its strong use). When the demonstrative has a weak use, it is neutral with respect to the speaker's position but it still maintains a contrastive interpretation. This can be illustrated in English with 'everybody knows that'. In some languages, the weak demonstrative must appear with a locative such as 'here' or 'there' if that information is necessary. In other languages, the use of the locative is optional and behaves like a reinforcer (e.g This book here, this here book) or in Spanish (e.g Este libro acá). Spanish and English, however, differ in that demonstratives are used in a wider set of contexts in Spanish. Therefore, in Spanish we can say 'el libro este', but in English it is impossible to say 'the book this'. In this project, we examine the acquisition of demonstratives in English and Spanish in order to determine how 3-5 year old children use demonstratives and to what extent the input encodes information for a strong or weak status of the demonstrative 'that' in English and 'este' in Spanish.

BACK TO THE PRESENT PERFECT: EVENT ORDERING UNDER THE PRESENT PERFECT AND THE SIMPLE PAST

Holly Langenstein, Kellie Zhou, Vivian Nguyen
Linguistics, Languages, and Speech, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 665
Mentor(s): Alan Munn (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

A sentence such as "John convinced his coach that he was too weak to play" has for most speakers, at least two interpretations with respect to the ordering of events in time. In this sentence, either the "convincing" happens at the same time as the "[being] too weak to play" (simultaneous reading) or the "convincing" is happening after the "[being] too weak to play" (shifted reading). When you change the Simple Past (convinced) to the Present Perfect (has convinced), the simultaneous interpretation disappears. While the sentence with the Simple Past can be used in two situations, the one with the Present Perfect can only be used in one situation. In other words, it is more restricted. It is sometimes assumed that the Present Perfect is being substituted by the Simple Past and this would perhaps affect the possible interpretations. Using a truth value judgement test, we are seeking to determine whether MSU undergraduate students are sensitive to the distinction between the tenses or whether speakers simply rely on the situation and do not notice the Present Perfect constraint. The subjects will be given a scenario and an accompanying sentence, where they will be asked to determine if the sentence fits the provided situation. The results of this experiment will give more insight into how people use the Present Perfect and if it is in fact unacceptable in a simultaneous interpretation.

BEYOND BACH: DISCOVERING THE SCOPE OF THE LIFETIME EFFECT

Jungwoo Kim, Madison Pritchett, Matthew R. Miller
Linguistics, Languages, and Speech, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 666
Mentor(s): Alan Munn (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

Imagine that someone says to you, "Bach has composed over 1,000 works of classical music". Your initial instinct is probably that something sounds off about this sentence, but you might not be sure why. In fact, this sentence sounds odd due to a linguistic phenomenon known as the lifetime effect. The lifetime effect asserts that when describing a subject that is deceased, it is only acceptable to use the past tense ("composed"), whereas when describing a living subject, both the past ("composed") and present perfect ("has composed") tenses are acceptable. Given this phenomenon, we are testing whether the lifetime effect is applicable beyond describing famous people—like Bach—that everyone knows are dead. To test this, we have compiled a group of test sentences that include famous dead people, famous living people, non-famous dead people, non-famous living people, as well as dead and living animals. These are mixed in with a large number of filler sentences that do not contain the material we are testing for, which serve as a control for our experiment. In our experiment, people are provided with a context followed by a sentence that they rate using a Likert scale (1-7) based on its acceptability related to the context. Our goal is to see if the lifetime effect applies when people are prompted with sentences containing non-famous and non-human subjects.

IF YOU'VE BEEN SICK, ARE YOU STILL SICK?: THE SCIENCE OF THE PRESENT PERFECT

Alexis Bowles, Andrew Hendren, Lacie Kunselman
Linguistics, Languages, and Speech, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 667
Mentor(s): Alan Munn (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES), Cristina Schmitt (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

In English, a sentence written in the Present Perfect tense such as "Molly has been sick" has two interpretations. Either Molly was sick and still is, or Molly was once sick but no longer is. In other words, the endpoint of Molly's condition is unclear. Adding a "for adverbial" can be used to disambiguate between the two interpretations. For example, saying "Molly has been sick for six days" will allow readers to take either interpretation; however, the sentence "For six days, Molly has been sick" will lead readers to prefer the interpretation in which Molly is still sick. We hypothesize that readers will prefer the ongoing interpretation for sentences beginning with a "for adverbial" and have an equal preference for the past and the ongoing interpretations when the sentence ends with a "for adverbial." Participants are given scenarios and given sentences with preposing and postposing adverbials to judge how well the sentences fit with the scenario which is designed to bias towards one reading or the other. With these findings, we hope to determine the effect of "for adverbials" on readers' preference for sentence meaning when using the Present Perfect tense.

PARENTAL REPORTS OF ATTENTION AND INHIBITION SKILLS IN CHILDREN WHO STUTTER

Shelby Russcher
Linguistics, Languages, and Speech, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 668
Mentor(s): Amanda Hampton Wray (EXTERNAL MENTOR)

Current research has suggested that multiple factors may contribute to the onset and development of stuttering, including motor, emotional, genetic, linguistic, and cognitive factors. Two aspects of cognition that have been suggested to play a role in stuttering include attention and inhibition. Studies that have utilized parent report measures of attention and inhibition have found conflicting findings. Some studies suggest that children who stutter (CWS) have weaker attention and inhibition skills compared to children who do not stutter (CWNS). For instance, CWS have been found to show weaknesses with shifting and inhibiting their attention. In contrast, other studies have found that CWS and CWNS do not differ in their attention and inhibition skills. Advantages of using parent report measures include parental familiarity with the child and the ability to assess attention and inhibition skills in everyday activities, such as at home, school, and in social situations, in a clinically-accessible format. The current study aimed to evaluate parent report of executive function in CWS and CWNS. Ongoing enrollment includes 22 CWS and 29 CWNS. It is predicted that CWS will have lower attention and inhibition scores than CWNS. Parents of 4- to 7-year-old CWS and CWNS completed three separate parent reports to determine whether consistent patterns emerged across measures. Data analyses are ongoing. Findings will enhance understanding of the role of attention and inhibition skills in developmental stuttering by providing information about how CWS and CWNS utilize these cognitive skills in their everyday life.

THE IMPACT OF HEAD AND NECK CANCER TREATMENT ON COMMUNICATION

Claire Netemeyer, Kate Shabet, Stacey Partain
Linguistics, Languages, and Speech, Poster Presentation
Section: 4, 3:00 - 4:30 PM

Presentation Number: 669
Mentor(s): Jeffrey Searl (COMMUNICATIVE SCIENCES AND DISORDERS)

The purpose of this study is to understand how communication is impacted in people treated for head and neck cancer. Particularly of interest is how communication has changed over time or as a function of age since completing the cancer treatment. Participants are adults with a diagnosis of cancer in the head and neck who completed their cancer treatment a minimum of 3 months before enrollment. Information about their cancer treatments, speech-language therapy, abilities to communicate in daily activities, motivation for continued improvement in their communication, and perceptions of communication change I the months and years since cancer treatment ended will be explored through a 60-minute face-to-face interview and 4 written surveys. Study outcomes will inform the understanding of the long term impacts of head and neck cancer treatment and the evolving impact on a person's quality of life.

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DISEASE

DEVELOPMENT OF A CYANOBACTERIAL DEGRON-BASED SYSTEM FOR RAPID, ADJUSTABLE TARGET-PROTEIN REDUCTION

Kam Kennicott
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 41
Mentor(s): Daniel Ducat (PLANT RESEARCH LABORATORY), Jonathan Sakkos (PLANT RESEARCH LABORATORY)

Cyanobacteria are photosynthetic microbes that have shown promise for their potential as cellular factories to turn carbon dioxide and sunlight into valuable chemicals. Synechococcus elongatus PCC 7942 is one of the best studied model cyanobacterium; yet, around 40% of its genes' functions remain unknown. This is due, in part, to the limits of current genetic tools used to investigate gene function. Towards this problem, we have adapted a degron-based system designed to enable rapid degradation of the proteins from these genes in a targeted fashion. Gaining control over protein targets can provide detail on their respective gene function. Here, we utilized molecular biology, fluorescence microscopy, and flow cytometry to characterize, optimize, and demonstrate our approach to targeted protein degradation. Our system achieved a six-fold reduction in specific fluorescent protein abundance when induced. When modified targeting the FtsZ gene, an essential protein used in cell division, our system displayed the elongated cell phenotype likewise found in other FtsZ mutation experiments. However, presence of the system, regardless of induction, appeared to cause some level of target-protein degradation. Through point mutations of key amino acids in the degron, we optimized our system to reduce background levels of target-protein reduction. Further optimization may be possible and yield a wider dynamic range of target-protein abundance between induced and uninduced states. Use of this approach grants access to uncharacterized cyanobacterial genes, and through extrapolation may yield answers to current problems in utilizing them for bioenergy and bioproduction.

CHARACTERIZING THE MECHANISM BY WHICH CYCLIC-DI-GMP MODULATES THE VIRULENCE OF ERWINIA AMYLOVORA

Jacob Hieber
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 42

Mentor(s): Brian Hsueh (MICROBIOLOGY & MOLECULAR GENETICS), Christopher Waters (MICROBIOLOGY & MOLECULAR GENETICS)

The Gram-negative plant pathogen Erwinia amylovora is the causative agent of the plant disease fire blight, primarily affecting apple and pear trees. This disease causes vast economic loss worldwide. E. amylovora disease progression involves a transition between a chronic biofilm state to a systemic acute infection state, utilizing the Type III Secretion System (T3SS). The ubiquitous second messenger molecule cyclic-di-GMP (c-di-GMP) regulates a wide variety of bacterial lifestyles, including biofilm formation, motility, and virulence. It has been shown that increased levels of c-di-GMP downregulates HrpL, the master regulator of T3SS in E. amylovora. Furthermore, c-di-GMP interacts with effectors, such as transcription factors, to regulate downstream pathways in many pathogens with T3SS. However, the molecular mechanism by which c-di-GMP regulates the signaling cascade leading to expression of the T3SS is less understood. I therefore hypothesize that c-di-GMP activates a repressor to downregulate hrpL expression, and thus inhibits T3SS in E. amylovora. Through random transposon mutagenesis, I have identified two genes, a putative transcriptional regulator and a putative two-component system, that repress hrpL under high c-di-GMP levels. Current work is focused on characterizing how E. amylovora utilizes c-di-GMP to control these repressors to modulate gene expression and adapt to environmental signals that initiate infection in apple and pear trees. The regulation of T3SS is highly complex, and the implication that c-di-GMP signaling involving c-di-GMP receptors contributes to controlling the T3SS could help us understand the mechanisms by which E. amylovora initiates infection, and may bring about further advancements in controlling fire blight.

MICROBIAL INTERACTIONS: WHAT IS HAPPENING BETWEEN FUSARIUM, PSEUDOMONAS, RHIZOBIUM AND SWITCHGRASS

Morgane Chretien

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 43
Mentor(s): Gregory Bonito (PLANT, SOIL, AND MICROBIAL SCIENCES), Pedro Beschoren da Costa (GREAT LAKES BIOENERGY RESEARCH CENTER)

The molecular and ecological interactions between Fusarium oxysporium, Pseudomonas chlororaphis, and Rhizobium daejeonense are important to understand because these microorganisms influence the development of the biofuel crop Panicum virgatum. Soil microorganisms interact with plant root exudates (substrates and signaling molecules) in a complex network of communicating, transferring and transforming compounds, which most, are unknown. Three strains of these microorganisms were previously isolated from Panicum virgatum from greenhouse and growth chamber experiments and associated with higher plant biomass. In this research, sterile Panicum virgatum seedlings were inoculated with one, two, or three member consortia. Staining plant-bacterial-fungal techniques and root architecture of Panicum virgatum were used for root colonization and growth patterns. While untargeted mass spectroscopy was used to screen root metabolites with a possible role in plant-microbe interactions beneficial for early plant development.

CAN EHV-1 IGG SUBISOTYPE TITERS IN SERUM OF HORSES PREDICT RISK FOR EQUINE HERPESVIRUS MYELOENCEPHALOPATHY

Nicole Mahmood

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 44
Mentor(s): Gisela Hussey (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

Equine Herpesvirus-1 (EHV-1) is an alphaherpesvirus and the cause of respiratory disease, epidemic abortion storms and equine herpes myoencephalopathy (EHM). Interestingly, the most devastating manifestation, EHM, occurs only in ~ 10% of infected horses. At this point the pathology and immune response to EHV-1 and contribution to developing EHM is not completely understood. However, it has been shown that the IgG subisotypes IgGa and IgGb are associated with protective humoral immunity, while the subtype IgG(T) blocks complement activation and opsonization, but does not provide protection from EHV-1. IgGb titers and the ratio of IgGb to IgG(T) can be used as a predictor of immune protection against EHV-1 and progression to EHM. We used an EHV-1 specific IgGa, IgGb, and IgG(T) antibody isotype ELISA to compare pre and post EHV-1 infection serum samples of yearling and old horses that exhibited various degrees of neurological symptoms. IgGa and IgGb antibody titers increased in both old and yearling horses following EHV-1 infection. IgG(T) titers increased slightly in old horses, but did not increase in yearling horses. Old horses with a high pre-infection IgGb appeared to be more likely to be protected from severe symptoms of EHM. In contrast, in yearling horses, high IgG titers did not seem to protect from neurological signs. Serum IgGb titers may be useful in the assessment of EHM risk in older horses. However, other factors including mucosal innate immunity and cellular immunity are important factors to consider for a complete assessment of EHM risk.

CHARACTERIZATION OF SURFACTANT-PRODUCING BACTERIA FROM MIDDLE-EAR ISOLATES IN MINIMAL MEDIA MIMICKING OTIC ENVIRONMENT

Mariam Charles

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 45
Mentor(s): Gemma Reguera (MICROBIOLOGY & MOLECULAR GENETICS)

Biological surfactants are amphiphilic molecules that decrease surface tension of fluid. Secretion of these molecules have been described in both eukaryotes and prokaryotes. Surfactants naturally secreted within the middle ear has roles in host defense against otic pathogens. As such, these molecules can provide relief for those experiencing recurrent middle ear infections, known as otitis media. When traumatic events occur to the middle ear, such as abrupt fluctuating pressure seen in deep-sea divers, normal defense functionality can be inhibited. Though long believed to be sterile, preliminary experiments performed in the Reguera 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 surfactants secreted within humans. These organisms could be targeted and engineered to provide increased protection through probiotics, further combating trauma and otitis medias. To explore this possibility, middle ear bacterial isolates were screened for surfactant production through a mineral oil drop assay. Initially, these isolates were cultured in an enriched media to identify the presence of surfactant production. Afterwards, they were cultured in a media mimicking the middle ear environment to determine if surfactant-production patterns, as well as growth patterns, were altered in this minimal media. This culmination of information provides insight into which bacteria could be targeted for middle ear-oriented probiotics. Here, we focus on identifying and characterizing middle ear isolates that respond well to otic-mimicking growth conditions and fluctuating anaerobiosis.

BIOMINING WITH M. EXTORQUENS AM1

Emily Hawker

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 46

Mentor(s): Nathan Good (MICROBIOLOGY & MOLECULAR GENETICS), Norma Martinez Gomez (MICROBIOLOGY & MOLECULAR GENETICS)

Rare earth elements (REE) are essential for technology and industry, however, REE supply remains restricted due to limited sourcing and environmentally destructive mining practices. Methylotrophic bacteria, which metabolize methane and methanol, can utilize REE as enzymatic cofactors, acquire them from the environment, and store them intracellularly. The active metabolic utilization and storage of REE by methylotrophs presents unexploited potential for biomining-technology using microbiology to acquire metals from complex sources. In this study, we are investigating the capacity of the model methylotroph Methylobacterium extorquens AM1 to utilize waste stream sources of REE, including neodymium from electronic waste and gadolinium from medical waste. Using genetically modified strains that rely on REE for growth with methanol, we show that M. extorquens AM1 grows robustly with neodymium magnet as the sole REE source. Growth with solid magnet is not significantly different from growth with soluble $NdCl_3$, indicating that an efficient REE solubilization and acquisition system is employed by the microbe when required. Utilizing the mutant strain of M. extorquens AM1 that requires REE for growth with methanol, we conducted a growth study with $GdCl_3$ as the sole REE source and observed growth after three weeks. Subsequent transfers of this strain grew to high culture densities in ~60 hours, indicating the strain adapted to growth with gadolinium. ICP-MS metal analysis confirms that M. extorquens AM1 strains acquire and store neodymium and gadolinium for REE-dependent growth. These results show the potential for M. extorquens AM1 for development into a sustainable REE biomining platform.

EFFECTS OF COEVOLUTION ON MICROBES

Nick Woodard
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 47
Mentor(s): John Chodkowski (MICROBIOLOGY & MOLECULAR GENETICS)

I will be discussing the effects on two microbes that have coevolved together and show how over time the ability for one microbe to develop an immunity helps it survive. I will also be talking about how when seperating the two species after initial introduction how they grew alone.

QUANTIFICATION AND CHARACTERIZATION OF THIRD-GENERATION CEPHALOSPORIN RESISTANT BACTERIA RECOVERED FROM MICHIGAN DAIRY CATTLE

Bailey Bowcutt
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 211
Mentor(s): Karla Vasco (EPIDEMIOLOGY AND BIOSTATISTICS), Rebekah Mosci (MICROBIOLOGY & MOLECULAR GENETICS), Samantha Carbonell (MICROBIOLOGY & MOLECULAR GENETICS), Shannon Manning (MICROBIOLOGY & MOLECULAR GENETICS)

In the United States, at least 2.8 million antibiotic resistant infections and 35,000 deaths occur each year. Third generation cephalosporins like ceftiofur are commonly used in pregnant women, children, and pregnant or lactating cattle due to their low toxicity. It is important to gain a greater understanding of the acquisition of antibiotic-resistant microbes on farms due to human-cattle transmission through food or environmental exposure. This longitudinal study explores the impacts of prophylactic treatments using ceftiofur on antibiotic resistance in the gut microbiome of dairy cattle. This study followed 40 dairy cows for nine weeks. After an initial fecal sampling, either an intramammary treatment with ceftiofur (n=20) or a non-antibiotic teat sealant (n=20) was applied. Of the 278 fecal

samples, 253 (91.0%) and 70 (25.2%) had ampicillin and ceftiofur resistance, respectively. The ceftiofur resistant isolates were biochemically characterized using differential and selective media. Of the 146 ceftiofur resistant isolates tested, 115 (78.1%) were Enterobacteriaceae with 94 (64.4%) representing Escherichia coli, while 27 (18.5%) were non-Enterobacteriaceae. Characterizing resistant isolates helps determine if resistance is intrinsic or acquired. Despite being blinded to treatment status, these results demonstrate how the frequency of resistance to beta-lactams was high after treatments and was found in multiple bacterial species. In the future, disk diffusion antibiotic testing will be fundamental to identifying the presence of extended-spectrum beta-lactamase (ESBL) among the ceftiofur resistant isolates. The impact of prophylactic ceftiofur teat treatment on antibiotic resistance in dairy cattle may influence future recommendations for appropriate treatments to prevent bovine mastitis.

SYNERGY OF NITRATES AND STORAGE TEMPERATURE ON RESISTANCE OF PSEUDOMONAS FLUORESCENS IN TURKEY

Megan Monforton
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 212
Mentor(s): Poorna Viswanathan (MICROBIOLOGY & MOLECULAR GENETICS)

Processed, deli meat and poultry highly concentrated in nitrates are widely consumed daily. Nitrates primarily are added to meat and poultry in order to limit growth of certain spoilage bacteria with the FDA limit of 500 ppm per product. Increasing nitrate exposure in meat and poultry products beyond this limit could result in human toxicity and induce metabolic pathways in other bacteria. Certain strains of Pseudomonas fluorescens have nitrate reduction genes similar to those in human pathogen, Pseudomonas aeroginosa. This could become an issue for those who consume meat and poultry, especially those who are immunocompromised. Several slices of processed Delifresh honey roasted turkey and Jennie-O's raw ground turkey were swabbed for bacterial isolates. Isolates were plated and grown at 37°C, 25°C, and 4°C. Strains of P. fluorescens were identified phenotypically through gram staining. Genotypic analysis was done through colony PCR and Sanger sequencing. Antibiotic resistance was tested through disk diffusion assays. Nitrate reduction was tested through inoculating a strain of P. fluorescens into 12 mM, 6 mM, 3 mM, 1.5 mM, and .75 mM concentrations of potassium nitrate broth and grown at 37°C, 25°C, and 4°C temperatures for 48 hours.

ISOLATION OF BACTERIOPHAGE AND IDENTIFICATION OF PHAGE-SENSITIVE BACTERIA FROM CHICKEN SAMPLES

Sarah Broida
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 213
Mentor(s): Victor DiRita (MICROBIOLOGY & MOLECULAR GENETICS)

As the number of antibiotic-resistant bacteria increases, an alternate solution to fighting bacteria is needed. Bacteriophage offer the potential for a novel treatment against bacterial infection. A bacterial strain was isolated from chicken fecal samples, as well as a PCR, and bacteriophage were analyzed from various environmental samples. The bacteria was plated with 10-fold serial dilutions of the phage isolate. Phage were found to decrease bacterial counts by forming plaques, or clearances, on the plate.

GLOBAL GENETIC APPROACHES TO DEFINE CD40 REGULATION IN MACROPHAGES

Claudia Vondra

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 214
Mentor(s): Andrew Olive (MICROBIOLOGY & MOLECULAR GENETICS)

Mycobacterium tuberculosis infection is the world's leading cause of infectious disease related death. There is a great need to develop new host-directed therapies that improve public health by modulating protective T-cells that help fight infection. One important co-stimulatory molecule that controls T cell responses is CD40. CD40 is found on the surface of macrophages, and initiates the activation of T cells and IL-17 production which in turn controls Mycobacterium tuberculosis. How CD40 is regulated remains an outstanding question, limiting our ability to target this important molecule. By globally defining CD40 regulatory networks we will be positioned to examine mechanisms that improve CD40 expression and protective T cell responses. Using a genome-wide screen we identified genes that are required for CD40 upregulation on activated macrophages. Surprisingly, we found Complex I of the electron transport chain (ETC) was required for CD40 induction. We hypothesized that the enzymatic product of Complex I, NAD+, was controlling CD40 expression expression levels. To test this hypothesis, we used genetic approaches to delete Complex I subunits and determine how CD40 expression is altered. In parallel we examined if NAD+ alone can control CD40 expression. Our results suggest that Complex I is a critical component to induce CD40 expression in macrophages and NAD+ is a central mediator of this response. We are now determining how other metabolic factors affect cytokines production to increase CD40 and activate T cells. The goal of these studies is to determine how CD40 expression is regulated to activate protective T cell responses to improve outcomes to Mycobacterium tuberculosis infection.

OXYBENZONE INCREASES PROLIFERATION IN TRP53-NULL MAMMARY TISSUES IN CONJUNCTION WITH HIGH FAT DIET

Mitchell Borin

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 215
Mentor(s): Anastasia Kariagina (MICROBIOLOGY & MOLECULAR GENETICS), Richard Schwartz (NATURAL SCIENCE)

Oxybenzone (benzophenone-3; BP3) is a common ingredient in many skincare products, including sunscreen. Previous research in the lab showed BP3 to increase cellular proliferation in normal mouse mammary glands. The previous study examined whether BP3 influences tumor proliferation in Trp53-null mammary glands, already prone to tumor development. In the current study, BP3-induced proliferation was examined in normal mammary tissue in younger mice (26-, 13-, and 8-week old mice), prior to the occurrence of tumors. BP3 impact was examined alongside that of diet, specifically content of saturated fat from red meat. Mice were either fed 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 BP3 compounded into their food (70 mg/kg of body weight). When mice reached target age, they were treated with the nucleotide analog BrdU, and then tissues 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. Increased proliferation was found in all BP3 treated groups at 8 and 26 weeks , with little effect at 13 weeks. This temporal pattern will be discussed. BP3 may

increase early mammary gland proliferation and products containing BP3 should be used with caution.

SHAPESHIFTER: VIBRIO CHOLERAE CONTROLS CELL MORPHOLOGY TO ADAPT TO DIFFERENT ENVIRONMENTS

Megan Seyerle
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 216
Mentor(s): Christopher Waters (MICROBIOLOGY & MOLECULAR GENETICS), Nicolas Fernandez (MICROBIOLOGY & MOLECULAR GENETICS), Soo Yoon (MICROBIOLOGY & MOLECULAR GENETICS)

Vibrio cholerae is a gram-negative bacterium characterized by its "comma-like" shape. This cell morphology arises due to expression of the protein CrvA. The function of cell curvature in V. cholerae, however, is unclear. We have shown that when expressed, CrvA leads to curved cells that favor a planktonic or motile lifestyle while repression of CrvA causes V. cholerae to become straight, favoring biofilm formation. We demonstrate that the expression of crvA is regulated by the signaling molecule cyclic di-GMP (c-di-GMP), which is controlled by local environmental signals. The concentration of c-di-GMP affects the activation of the transcriptional regulator VpsT. We therefore hypothesized that VpsT affects cell morphology by repressing crvA at either the transcriptional or translational level. In support of this hypothesis, co-expression of crvA with the wild type vpsT gene decreased cell curvature. Furthermore, overexpression of vpsT leads to a decrease in curvature, and the levels of crvA mRNA decreases. These results suggest that VpsT may inhibit cell curvature by inhibiting crvA mRNA from being translated into protein rather than affecting the protein function. Further studies will focus on unraveling the molecular regulators of cell shape and how cell morphology allows bacteria to adapt to various environments.

ELUCIDATING THE ROLE OF MECR1 IN METABOLIC POTENTIATION OF OXACILLIN RESISTANCE IN STAPHYLOCOCCUS AUREUS

Jessica Liu
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 217
Mentor(s): Neal Hammer (MICROBIOLOGY & MOLECULAR GENETICS), Paige Kies (MICROBIOLOGY & MOLECULAR GENETICS)

Methicillin-Resistant Staphylococcus aureus (MRSA) is the leading cause of morbidity and mortality associated with antibiotic-resistant bacterial infections in the United States. With the ability to spread from the bloodstream to the heart, bones, and lungs, S. aureus is also commonly isolated from patients with cystic fibrosis (CF). Previously, I discovered that anaerobic, fermentative metabolism augments oxacillin resistance in MRSA strains isolated from CF patients. In MRSA strains, full-length MecR1 controls expression of MecA, the major oxacillin resistance factor. Some strains of S. aureus harbor full-length mecR1, but the current strain endemic in the United States encodes a truncated version due to a transposon insertion. Laboratory MRSA strain JE2 encodes truncated mecR1 and demonstrates enhanced anaerobic resistance, whereas strains harboring full-length mecR1 do not. It is currently unknown whether truncated MecR1 controls mecA levels. Based on these facts, I hypothesize that CF isolates demonstrating increased anaerobic oxacillin resistance encode a truncated mecR1. I also observed subpopulations of heteroresistant colonies in CF isolates and I found that a JE2 strain harboring a transposon within mecR1 increases heteroresistance, indicating that truncated mecR1 inhibits heteroresistance development. I hypothesize that the subclass of CF isolates exhibiting heteroresistance contain inactivating mutations within mecR1. This

project looks to determine which mecR1 allele the CF isolates encode and how expressing a full-length mecR1 gene in strains harboring truncated mecR1 affects increased anaerobic oxacillin resistance. These studies will add valuable insight into the mechanisms that support the metabolic-dependent antibiotic resistance of S. aureus.

PURIFICATION OF DNA FOR DIAGNOSTICS

Nick Saba
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 218
Mentor(s): Evangelyn Alocilja (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Saad Sharief (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Extraction of DNA from microbes is a vital process for biological research within many fields. Even though diagnosis of infectious diseases uses DNA as an integral part of testing, the standard extraction method of DNA is both costly and time consuming. Using commercially available kits is laborious and requires resources not always available in low income areas where human health crises are prevalent. A better DNA extraction method is needed. In this alternative method, a previously confirmed method of extraction dubbed the "boiling" method was used, which involves boiling whole bacterial cells to break them open and expose the DNA. While this method is faster and more cost-effective, problems arise when testing its purity. As cell debris is still left over after boiling, there needs to be some way of purification. 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 if equal levels of purity can be achieved. In order to accomplish purity, magnetic nanoparticles (MNPs) were used to help discard cell remnants. These MNPs attach to cell walls and organelles, and can then be magnetically separated from the DNA, yielding cleaner results. Preliminary tests show that the boiling method works, and that this relatively simple technology could be utilized to acquire bacterial DNA in areas with low resources. More tests will be conducted to identify the exact amounts of pure DNA collected, as well as further attempts at purification.

INDOLE AS A POTENTIAL ANTIMICROBIAL AGAINST CAMPYLOBACTER JEJUNI

Cameron Raedy
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 397
Mentor(s): Victor DiRita (MICROBIOLOGY & MOLECULAR GENETICS)

Campylobacter jejuni is a Gram-negative bacterium that causes human gastroenteritis but lives in poultry - the major source of human infection - as a commensal. Our aim is to reduce the colonization load of C. jejuni in chickens, thereby reducing human exposure risk. Antibiotics to limit C. jejuni in poultry can transmit antibiotic resistance that would threaten human health, so new approaches are needed. Our aim is to identify and target specific traits in C. jejuni essential for colonizing poultry. Indole is a common microbial metabolite that influences virulence of several enteric pathogens, but its effects on C. jejuni have not been determined. We show that indole reduces growth and flagellar-based motility of C. jejuni isolates and my current work explores the mechanisms underlying this. In E. coli, indole reduces membrane potential and alters respiration, and preliminary data show that, similarly, C. jejuni cultured in indole-3-propionic acid exhibited decreased ATP. I am also investigating whether indole-producing bacteria can limit C. jejuni growth and motility in mixed culture to determine whether a probiotic may enable us to limit C. jejuni chicken colonization. Additionally, I am investigating how C. jejuni overcomes the inhibitory effects of indole in the gut during

infection. I have constructed a mutant lacking formate dehydrogenase, which converts formic acid and harvests electrons in the process; this will enable me
to test whether C. jejuni uses formic acid to overcome the inhibitory effects of indole. My work may enable us to develop antibiotic-sparing approaches against C. jejuni.

ANTIMICROBIAL ACTIVITY OF SELECT ESSENTIAL OILS AND THEIR PRIMARY CHEMICAL CONSTITUENTS AGAINST STAPHYLOCOCCUS AUREUS BIOFILMS

Mike Witte

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 398
Mentor(s): Jonathan Hardy (MICROBIOLOGY & MOLECULAR GENETICS)

The pathogenic, Gram-positive bacteria Staphylococcus aureus has become a major threat to human health due to its ability to efficiently cause infections in immunocompromised individuals and hospital patients. This pathogen can lead to a variety of diseases that range from mild infections to life-threatening diseases. S. aureus has an innate ability to form biofilms on non-living surfaces, such as medical implants, as well as on living tissues. These biofilms play a large role in the ability of S. aureus to develop antibiotic resistance, which necessitates a deeper understanding of these biofilms as well as the development of alternative antibiotic therapies to combat them. XEN36, a bioluminescent strain of S. aureus, was grown as a biofilm in 24-well culture plates. Cinnamomum zeylanicum (cinnamon bark) and Eucalyptus globulus (eucalyptus) essential oils as well as their principal chemical constituents, cinnamaldehyde and eucalyptol, were tested against the biofilm at varying dilutions. The antibacterial activity of these compounds was examined through the utilization of dilution and minimum inhibitory concentration (MIC) assays. The growth and inhibition of viable biofilms were observed and quantified using bioluminescence imaging (BLI). Antimicrobial activity against S. aureus biofilms was demonstrated in vitro by both the eucalyptus and cinnamon bark oils, as well as for the cinnamaldehyde. These results suggest that these natural plant extracts may have therapeutic potential for the treatment of S. aureus infections. These promising results could be of use for further in vivo testing, and future experiments will need to explore the antibiotic activity of other essential oils.

INVESTIGATION OF PLASMID-MEDIATED RESISTANCE IN THE HUMAN GUT MICROBIOME

Ashley Peer

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 399
Mentor(s): Azam Sher (GENETICS PROGRAM), Linda Mansfield (LARGE ANIMAL CLINICAL SCIENCES), Lixin Zhang (EPIDEMIOLOGY AND BIOSTATISTICS)

The emergence of antibiotic resistance (ABR) is one of the most prevalent and urgent threats to public health. Horizontal gene transfer (HGT) is considered a major driving force of emergence and spread of ABR among bacteria. Little is known about the role of the human gut microbiome in the development of ABR which is considered a reservoir of antibiotic resistance genes (ARGs). Sharing and acquiring of ARGs via HGT is naturally occurring in the gut microbiome where millions of bacteria are closely located and frequently make contacts to each other. In previous work, HGT has often been studied in the lab settings using lab modified strains which doesn't mimic bacterial strains present in the host gut. To address this gap of knowledge, we have isolated commensal E. coli from the mouse gut and successfully tagged with fluorescent protein and antibiotic resistance genes on its chromosome. We have modeled an in vitro plasmid-mediated conjugation system where we are studying the transfer of ARGs in the commensal mouse gut E. coli from various donor bacterial strains with

conjugative plasmids carrying certain antibiotic resistance genes and fluorescent tags. We are using Culturomics, PCR and fluorescent microscopy to isolate, confirm and visualize donor and recipient bacteria respectively. The use of fluorescent-activated cell sorting (FACS) paired with emulsion, paired isolation, and concatenation PCR (epicPCR) will enable the easy identification of transconjugants from donor and recipient. Findings from this study will lead us to mitigate the plasmid-mediated transfer of ARG in the human gut microbiome.

QPCR OPTIMIZATION TO DETERMINE ANOPHELES MOSQUITO SPECIES: ENHANCING MALARIA PREVENTION

Laura Pavliscak, Madison Patrus
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 400
Mentor(s): Karl Seydel (OSTEOPATHIC MEDICAL SPECIALTIES)

Despite the implementation of multiple prevention and control measures, Malaria rates in Malawi have not decreased as expected. This may be due to varying biting patterns and behavior of Anopheles mosquito species. Anopheles funestus and gambiae mosquitoes are malaria transmitting species found in Malawi. In order to determine how to best decrease malaria transmission, a specific test for A. funestus mosquitoes is needed. It is known that increasing the temperature of a PCR reaction increases how many base pair matches are needed for elongation to occur. Therefore, we hypothesize that there is an optimal PCR temperature that allows to be specific for A. funestus mosquito DNA that does not allow for the amplification of A. gambiae DNA. We used a species-specific probe that matches 100% for funestus and 24/27 base pairs for the gambiae gene. We used a DNA extraction protocol to extract DNA from the A. funestus and A. gambiae mosquitoes using whole bodies and an extraction buffer. Samples were run using Real-Time PCR to quantify the amount of DNA amplified at different temperatures. We concluded that the optimal elongation temperature for this assay is between 62 and 65 degrees Celsius. Determining the species of mosquito present in an area can lead to more targeted prevention efforts and an effective use of resources.

EFFECTS OF POINT MUTATIONS ON CDK12/CDK13 ON THE RELATIVE EXPRESSION LEVELS OF SER5 IN HIV-1 INFECTION

Alexandra Picardal
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 401
Mentor(s): Qingqing Chai (MICROBIOLOGY & MOLECULAR GENETICS), Yong-Hui Zheng (MICROBIOLOGY & MOLECULAR GENETICS)

HIV-1 is a retrovirus that can infect humans and attack CD4+ T cells. The human SERINC5 (Ser5) protein has been shown to decrease viral infectivity by inhibiting HIV-1 replication. However, the HIV-1 accessory protein Nef has been shown to downregulate Ser5, causing a subsequent increase in viral infectivity. Previous results have shown that it is necessary for the CDK/cyclin K complex to interact with Ser5 in order for Nef to downregulate it. Ser5 has been shown to bind indirectly to CDK12 and directly to CDK13. In order to further explore the molecular mechanism of Ser5 antagonism by Nef, it is necessary to determine the specific amino acid residues that are involved in the interaction between CDK12/13 and Ser5. Molecular cloning techniques were used as a screening mechanism in order to pinpoint these specific amino acid residues. The goal of this study is to determine whether mutations on specific residues on CDK12 (858aa and 858aa/876aa) and CDK13 (837aa and 837aa/855aa) will affect the expression of Ser5. This was done using western blotting techniques in order to visualize relative protein expression in cells transfected with

Nef/ΔNef, mutant CDK12/CDK13, and Ser5 compared to cells transfected with Nef/ΔNef, WT CDK12/CDK13, and Ser5. We found that mutations at 858aa and 876aa in CDK12 did not affect Ser5 expression in the presence of Nef; however, an 837/855aa double mutation on CDK13 led to Ser5 resistance to Nef, suggesting that these residues are essential for the interaction between CDK13 and Ser5.

SCANNING ELECTRON MICROSCOPE ANALYSIS OF DIATOMITE

Hattie Pimentel
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 402
Mentor(s): Carl Boehlert (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Diatoms are a group of microalgae that inhabit freshwater and ocean environments. The cell wall of the diatom is a silicon structure called a frustule. Frustule structure varies widely in shape and complexity by species. As diatoms die, their frustules sink and accumulate at the bottom of aquatic environments, eventually fossilizing and forming a soft sedimentary rock called diatomite, or "diatomaceous earth." Diatomaceous earth is mined and marketed for a variety of purposes, including filtration, abrasion, pest control, and food supplementation. This poster seeks to compare the structures of diatom frustules found in diatomaceous earth marketed for varying purposes, as well as use methods to generate high-quality images of frustules. A scanning electron microscope (SEM) was used to examine the topographies of diatomaceous earth marketed for different purposes. In conjunction with a literature review, this poster then hypothesizes on the properties of the frustules found in different diatomaceous earth products. This poster analyzes the differences (or lack thereof) between different types of diatomaceous earth.

MICROBE-MICROBE INTERACTIONS ON PLANT SURFACES

Keean Dolan
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 403
Mentor(s): Ashley Shade (MICROBIOLOGY & MOLECULAR GENETICS), Keara Grady (GREAT LAKES BIOENERGY RESEARCH CENTER)

The microbial community that inhabits a plant can effect host stress tolerance, pathogen resistance, and biochemical cycling of greenhouse gasses such as methane or N_2O. Switchgrass (Panicum virgatum) is targeted as a second-generation biofuel crop. Understanding the dynamics of the switchgrass microbiome is expected to advance goals of supporting switchgrass growth in a variety of stressful conditions. Our work has three specific goals: to isolate bacteria from the on the leaf (phyllosphere) and root (rhizosphere) communities, taxonomically identify the isolated bacterial strains, and investigate how the microbes interact with each other and with the plant. For the last goal, we use a plate-based interaction array that includes 93 bacterial strains isolated from plants grown at the Kellogg Biological Station Bioenergy Cropping System Experiment, which is a field site affiliated with the Great Lakes Bioenergy Research Center. Isolated bacteria were arrayed onto agar assay plates to ascertain microbe-microbe interactions between core microbiome members. Next, these interactions will be tested with and without plant chemical signatures like hormones, saponins, and terpenes. Our objective is to understand how the plant could influence microbial interactions as well as individual microbial colony growth. Microbial responses are measured by growth patterns and colony size. Future work will investigate the consequences of these chemical engagements

for plant-microbiome interactions, and how those interactions may benefit the plant by supporting productivity or resilience.

UNDERSTANDING THE EMERGENCE OF ANTIBIOTIC RESISTANCE IN CAMPYLOBACTER JEJUNI

Sharbel Daher

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 404
Mentor(s): Azam Sher (GENETICS PROGRAM), Linda Mansfield (LARGE ANIMAL CLINICAL SCIENCES)

Multi-drug resistant Campylobacter jejuni (C. jejuni) infections are becoming an urgent threat for clinical settings. Based on the CDC report published in 2019, antibiotic resistant (AR) C. jejuni caused 448,400 infection and 70 deaths every year in the united states. Sharing of resistance genes through conjugation has been observed in many bacterial species, but there is little known about the role of conjugation in the emergence of antibiotic resistance in C. jejuni. We hypothesize that C. jejuni has potential to acquire and share these resistance genes through conjugation with other bacteria in the gut. To address this question, we are currently tagging C. jejuni with mScarlet fluorescent protein and antibiotic resistance markers that will aid us in visualizing and easily isolating C. jejuni from complex microbial community using selective media containing different combinations of antibiotics. Our aim is to study the transfer of antibiotic resistance genes through conjugation from donor Escherichia coli (E. coli) bacteria carrying a conjugative plasmid to our fluorescent tagged C. jejuni. First, we will study this transfer in vitro, then we will also perform an in vivo mouse experiment to investigate the transmission of ARGs in the gut microbiome. Findings from this study will enhance our understanding about the emergence of antibiotic resistance in C. jejuni and find a solution to discover new strategy to reduce the emergence of antibiotics.

A COMPUTATIONAL APPROACH TO REPURPOSE HOST-DIRECTED THERAPEUTICS AGAINST MYCOBACTERIUM TUBERCULOSIS AND STAPHYLOCOCCUS AUREUS INFECTIONS

Phoebe Tuyishime

Microbiology, Immunology, and Infectious Disease, Oral Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 405
Mentor(s): Arjun Krishnan (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING), Janani Ravi (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

Despite the introduction of effective and inexpensive drugs, infectious diseases still account for a fifth of all deaths worldwide because pathogens invariably develop resistance to these drugs. This challenge can be addressed by focusing on host-directed therapeutics (HDT) that can enhance our body's protective immune responses against pathogens. An attractive route to HDT is to bypass the expensive and time-consuming process of drug development by repurposing existing FDA-approved drugs. Since drugs have multiple mechanisms of actions, those designed for non-communicable/genetic diseases could be exploited to fight infectious diseases at reduced cost and time. This project aims to: i) develop a computational workflow to repurpose approved drugs for HDT in infectious diseases, and ii) apply this approach to discover HDTs against Mycobacterium tuberculosis (Mtb) and Staphylococcus aureus infections. We will obtain infectious disease-related expression datasets from NCBI GEO and drug-related expression datasets from CMAP) and LINCS. Based on the hypothesis that HDT candidates will reverse the effects of the disease, we will identify potential drug-disease pairs that show anti-correlation between the drug and disease expression signatures. Further, permutation and statistical tests, as well as experiments using phenotypic assays will be

carried out to validate our results. We will develop and test our computational workflow on both Mtb and S. aureus infection datasets to: (i) identify critical genes consistently perturbed, (ii) identify pathways perturbed, and (iii) generate a prioritized list of candidate host-directed drugs that could target the key dysregulated gene signatures/pathways.

BIALAPHOS INHIBITS STAPHYLOCOCCUS AUREUS PROLIFERATION IN NUTRIENT-LIMITING ENVIRONMENTS IN A DTPT TRANSPORTER-DEPENDENT MANNER

Abigail Kuplicki

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 406
Mentor(s): Neal Hammer (MICROBIOLOGY & MOLECULAR GENETICS), Paige Kies (MICROBIOLOGY & MOLECULAR GENETICS)

Staphylococcus aureus is a Gram-positive, opportunistic pathogen that causes both nosocomial and community-acquired infections. S. aureus rapidly develops antibiotic resistance, necessitating continuous development of therapeutic strategies. Bialaphos is a bactericidal tripeptide herbicide that inhibits glutamine synthetase, impairing production of the amino acid glutamine. We hypothesize that bialaphos is transported into S. aureus when cultured in glutamine-depleted environments and that this activity is dependent upon a peptide transporter. Using Kirby-Bauer disk diffusion assays in nutrient-rich and nutrient-limited conditions, I establish that S. aureus displays glutamine-dependent sensitivity to bialaphos. Additionally, strains harboring a mutation in the glutamate-containing peptide transporter, dtpT, are resistant to bialaphos killing. To validate the role of DtpT in bialaphos sensitivity, I am performing complementation studies in the dtpT mutant. I also seek a better understanding of the mechanism of S. aureus bialaphos resistance. I hypothesize that bialaphos exposure causes S. aureus to mutate dtpT, potentially blocking bialaphos import. To investigate this, I am employing Sanger sequencing technology to compare dtpT in strains that display varying degrees of bialaphos resistance. This work represents the first investigation of bialaphos hijacking the DtpT transporter to gain access to its target and reveals a new strategy to combat infection within nutrient-depleted environments in the host.

MIGHT HISTORY REPEAT? PROBING THE EVOLVABILITY OF A NOVEL TRAIT IN LONG-TERM EXPERIMENTAL POPULATIONS OF ESCHERICHIA COLI

Jessica Baxter

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 407
Mentor(s): Zachary Blount (MICROBIOLOGY & MOLECULAR GENETICS)

Evolution involves a combination of stochastic (mutation, genetic drift) and deterministic (natural selection) processes that makes outcomes historically contingent and less repeatable. The Long-Term Evolution Experiment (LTEE) was designed to address evolutionary repeatability. It has studied 12, initially identical populations of E. coli for over 70,000 generations in a minimal glucose medium that also contains citrate. E. coli cannot grow aerobically on citrate because it lacks an appropriate transporter when oxygen is present. Nonetheless, a Cit+ variant evolved in one population after 31,000 generations. The trait was actualized by a duplication that placed a citrate transporter gene, citT, under the control of a promoter for an aerobically expressed gene, rnk. However, the benefit of the Cit+ trait was contingent on the prior accumulation of potentiating mutations, without which CitT expression was detrimental. To date, the Cit+ trait has not re-evolved in any other LTEE population. We sought to determine if this non-recurrence was because none of the other populations was potentiated. We engineered Cit+ constructs of clones isolated from other LTEE populations at 50,000 generations and competed them against their parents to assess

the trait's phenotype and fitness effect. We found that Cit+ confers a variable phenotype and a significantly detrimental to slightly beneficial fitness effect, depending on the background. These results suggest that some of the LTEE populations have had histories that have resulted in potentiating genetic backgrounds within which the Cit+ trait can re-evolve.

MOLECULAR PROBE-BASED MULTIPLEX QPCR IDENTIFIES BLOODMEAL HOSTS AND DETECTS PLASMODIUM INFECTION IN ANOPHELES MOSQUITOES FROM PAPUA NEW GUINEA

Georgia Artzberger, Mary Gillies
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 408
Mentor(s): Edward Walker (MICROBIOLOGY & MOLECULAR GENETICS), John Keven (MICROBIOLOGY & MOLECULAR GENETICS)

Detection of Plasmodium infection and identification of bloodmeal host in mosquitoes are crucial for quantifying vectorial capacity and malaria transmission intensity of mosquito populations. Accurate estimation of these variables depends upon the sensitivity of the assays to samples with low parasite load and traces of blood. This project focused on the development of probe-based multiplex qPCR for identifying three common bloodmeal hosts (humans, pigs, and dogs) and detecting two malaria parasite species (Plasmodium falciparum and Plasmodium vivax) in female Anopheles mosquitoes from Papua New Guinea. TaqMan probes targeting specific regions of mitochondrial or nuclear DNA of each target species were designed and a triplex qPCR consisting of the three bloodmeal host probes and a duplex consisting of the two parasite probes were developed and optimized for efficiency, sensitivity and specificity. The assays had a sensitivity to 1.46 copies/ml of Plasmodium 18S rRNA target gene and 10-5 ng/ml of host bloodmeal DNA in mosquito samples. Of 3,042 field-caught Anopheles mosquitoes tested for malaria infection in head and thorax, 0.89% were positive for Plasmodium falciparum and 0.2% were Plasmodium vivax positive, the latter values congruent with previous estimates of Plasmodium infection rate. The bloodmeal qPCR identified 335/375 (89%) of the vertebrate host samples, while only 104/188 (55%) were identified using conventional multiplex PCR. The qPCR assays described here sensitively detect low DNA concentration in samples and are therefore useful for bloodmeal analysis and malaria parasite detection in field-caught mosquitoes.

OPTIMIZING QPCR ASSAY FOR 18S RRNA GENE FOR PLASMODIUM FALCIPARUM

Georgia Artzberger
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 409
Mentor(s): Frances Downes (BIOMEDICAL LABORATORY DIAGNOSTICS PROGRAM)

Malaria is a significant public health threat with more than 3 billion people exposed globally. The objective of this study is to optimize the 18S RNA qPCR test to be able to detect malaria parasite load at low levels of parasites per microliter per blood. We hypothesized that increasing probe concentration will increase sensitivity and decrease the number of cycles required to reach threshold. After conducting multiple trials using varying concentrations of probe, it was observed that using higher probe quantities resulted in a decrease in the number of cycles necessary to reach the detection threshold. However, it was discovered that changing the concentration of parasites is a larger factor in affecting the number of cycles needed to reach the threshold than altering the qPCR protocol.

MECHANISMS OF HOST-DERIVED GLUTATHIONE IMPORT AND CATABOLISM IN ANTIBIOTIC RESISTANT STAPHYLOCOCCUS AUREUS

Michael Wischer
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 410
Mentor(s): Joshua Lensmire (MICROBIOLOGY & MOLECULAR GENETICS), Neal Hammer (MICROBIOLOGY & MOLECULAR GENETICS)

Staphylococcus aureus is an opportunistic pathogen that causes a wide array of diseases in humans. To proliferate and cause disease, S. aureus must acquire essential nutrients from the host. One essential nutrient, sulfur, is vital for S. aureus to establish infection because it is a critical component of cysteine and methionine, and essential for synthesis of metabolic cofactors such as iron-sulfur clusters. S. aureus acquires glutathione (GSH), a tripeptide containing glutamate, cysteine, and glycine as a sulfur source in vitro. GSH is found in host cells at millimolar levels, and consequently represents an abundant sulfur reservoir for pathogens. Using a genetic approach, we discovered that a putative nickel-peptide ABC-transporter and γ-glutamyl transpeptidase (ggt) are required for in vitro proliferation of S. aureus in medium supplemented with GSH in either the reduced or oxidized (GSSG) forms. Consistent with these results, we named the ABC transporter the glutathione import system, or gisABCD. Our findings support the hypothesis that GisABCD imports GSH while Ggt catabolizes the tripeptide. GisA is annotated as an ATPase and contains Walker A/B boxes typically present in this enzyme family. ATP hydrolysis assays will validate GisA as an ATPase. Ggt degrades GSH in Escherichia coli and humans, but GSH or GSSG cleavage by S. aureus Ggt has not been determined. This work seeks to define enzyme kinetics of Ggt using GSH and GSSG as substrates. In total, this investigation increases our understanding of the molecular mechanisms supporting S. aureus acquisition of nutrient sulfur at the host-pathogen interface.

MICROBIAL COMMUNITY RESPONSES TO GROUNDWATER DISTURBANCES - A BENCHTOP APPROACH

Maria Berry
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 411
Mentor(s): Lindsay Williams (CENTER FOR INTEGRATIVE STUDIES - GENERAL SCIENCE), Matthew Schrenk (EARTH AND ENVIRONMENTAL SCIENCES)

Perturbations caused by groundwater extraction are known to disturb microbial communities in the subsurface, resulting in altered microbial community composition and biogeochemical cycling. Despite our basic understanding of this, we still do not understand the specific effects these disturbances have on the biogeochemistry of the system or the water quality of important groundwater resources. To address this problem, fluid samples were collected for microcosm experiments from the Coast Range Ophiolite Microbial Observatory (CROMO) in California, where recent work using time series data indicates that sterile oxygenated water used as drilling fluid, and changes in hydrogen and acetate concentrations were major geochemical changes following drilling. This study uses microcosms to assess the responses of microbial communities to the three specific geochemical changes mentioned above. Gas and aqueous chemistry samples, and cell count data from the experiments, will allow us to better understand how perturbations in the subsurface environment altered the growth and composition of microbial communities at CROMO. The second aim of this study is to isolate bacteria from the candidate genus Serpentinomonas. Serpentinomonas was identified as an organism that appeared to flourish following drilling activity at CROMO. By isolating this microorganism, we hope to better understand the physiology and metabolism of a potential

key player in the CROMO microbial community stress response. Additional culturing work and sequencing from these experiments will inform us of the mechanistic responses of microbial communities to drilling perturbation at CROMO and can serve as a template for understanding other recently drilled groundwater systems.

CONJUGATION FOR PLASMID DELIVERY INTO GROUP B STREPTOCOCCUS

Shealyn Mandle
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 412
Mentor(s): Jonathan Hardy (MICROBIOLOGY & MOLECULAR GENETICS)

Streptococcus agalactiae, also known as Group B Streptococcus (GBS), is a Gram-positive bacterium present in the vagina and/or rectum of about 25% of all healthy women. GBS is normally not a threat until a woman becomes pregnant. If GBS is passed from a mother's genital tract to a baby during birth, the newborn will be at risk for sepsis, pneumonia, meningitis or seizures. In the United States, about 900 babies are infected with early-onset GBS every year. About 4-6% of infected babies will actually die from the infection. As the most common cause of infection in newborns, GBS has become a very relevant pathogen in medical research. The organism is surrounded by a bacterial capsule that is difficult to penetrate. This makes introducing DNA to GBS very challenging, hindering extensive research on this particular organism. With the goal of inserting reporter genes, such as the lux operon, into the genome of GBS, the conjugative plasmid pTCV-erm was used to permit conjugation between E. coli and GBS. This plasmid encodes erythromycin and kanamycin resistance. After many attempts, mating was finally achieved with a filter-based system where log phase bacteria are concentrated onto a filter. Antibiotics used were kanamycin to select for the plasmid and kill the recipient GBS, as well as nalidixic acid to select against the donor E. coli. After selecting on 1,000 ug/ml kanamycin, we screened for resistance to erythromycin to confirm the presence of the pTVC-erm plasmid in GBS. A version of this vector containing a lux operon has been constructed and efforts will continue with hopes of introducing bioluminescent GBS into small animals for imaging of the pathogen.

THE EFFECT OF GENETIC BACKGROUND ON THE FITNESS COSTS OF RESISTANCE MUTATIONS

Jalin Jordan
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 599
Mentor(s): Kyle Card (BIOMOLECULAR SCIENCE GATEWAY), Richard Lenski (PLANT, SOIL, AND MICROBIAL SCIENCES)

Bacteria often evolve spontaneous mutations or acquire genes that confer resistance to antibiotics; a phenomenon known as antibiotic resistance. However, these mutations often carry a fitness cost. This cost occurs as resistance mechanisms either increase the energetic burden on the cell or disrupt the normal functioning of metabolic pathways and physiological processes. One would therefore expect that sensitive cells would outcompete their resistant counterparts in the absence of antibiotics. Despite this expectation, it is not well understood how prior evolution in an environment without stressors, including antibiotic drugs, affects the fitness costs of resistance mutations that evolve under subsequent drug selection. We address this question using Escherichia coli strains from the long-term evolution experiment (LTEE) that independently evolved under relaxed selection for multiple decades in a permissive environment. We focus our study on quantifying the fitness costs of resistant mutations to the drugs ampicillin and tetracycline by competing cells harboring these mutations with their sensitive progenitors. We predict that the fitness costs of resistance

mutations will depend upon their genetic context and thus correlate with a history of relaxed selection in the LTEE. The results from our study may have a number of implications for the public health sector. For example, our work may improve our understanding of the evolutionary processes underlying resistance evolution and its prediction.

EFFECTS OF OXYBENZONE ON EOSINOPHIL POPULATIONS IN P53-NULL MAMMARY GLANDS EXPOSED TO VARIOUS SATURATED ANIMAL FAT CONTAINING DIETS: PRE-TUMOR AND TUMOR MAMMARY GLAND TISSUES

Kristin Knickerbocker

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 600
Mentor(s): Reyhaneh Hooshyar (MICROBIOLOGY & MOLECULAR GENETICS), Richard Schwartz (NATURAL SCIENCE), Sandra Haslam (PHYSIOLOGY)

Oxybenzone (BP-3) is a sunscreen agent that has estrogenic activity, increasing epithelial proliferation in the mammary gland. Our previous studies show that high-fat diet promotes mammary tumorigenesis and alters immune cells in the mammary gland. Our current study examines the effects of BP-3 on eosinophils in pre-tumor mammary epithelium and tumors in p53-null mammary glands of BALB/c mice fed varying dietary regimens. Mice were fed diets ±BP-3: low-fat diet (LFD), high-fat diet (HFD), LFD switched to HFD (L-H), and HFD switched to LFD (H-L), and switches occurring at 10 weeks of age. Mammary glands were examined at 6, 7, 8, 13, and 26 weeks of age (pre-tumor), as well as tumors. Eosinophils were stained with New Vital Red and quantitated at 40x magnification. Eosinophils were increased by BP-3 in mice fed LFD diet at 7, 13, and 26 weeks, HFD diet at 7, 8, and 13 weeks, and L-H diet at 13 and 26 weeks. Initially, BP-3 increased eosinophils at 13 weeks on H-L diet, but at 26 weeks decreased numbers were observed. Epithelial tumors that arose in mice treated with BP-3 had increased eosinophils on the tumor periphery on LFD and H-L diets and increased eosinophils inside tumors on LFD, L-H, and H-L diets. Spindle cell tumors had increased eosinophils in their interior on LFD and H-L diets. In conclusion, BP-3 generally increases eosinophils in mammary glands and epithelial tumors, and this is heightened additively by HFD. Implications for the immune response to mammary tumorigenesis will be discussed.

THE ROLE OF MIGRATORY SONGBIRDS IN THE SPREAD OF THE TICK VECTOR, IXODES SCAPULARIS, AND THE LYME DISEASE PATHOGEN, BORRELIA BURGDORFERI

Belinda Wilson

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 601
Mentor(s): Jean Tsao (FISHERIES & WILDLIFE)

Blacklegged tick (Ixodes scapularis) population establishment has become an increasing public health concern for the state of Michigan. The first established populations in lower Michigan were detected in 2002. Migratory songbirds are an understudied host that are implicated in the spread of blacklegged ticks to new areas. This study examines how tick species composition on infested songbirds may have changed over the past decade in Calhoun County. From 2004-2009, we mist netted songbirds at Fort Custard State Recreation Area. Here we present tick infestation records from 2018-2019 from songbirds at Fort Custer Training Center (FCTC). Songbirds at FCTC have been mist netted from May-August at three sites in FCTC. Ticks collected from birds were sent to Michigan State University to be identified and assayed for B. burgdorferi, the Lyme disease pathogen. In the 2018 and 2019 migratory season, 140 birds were infested with 383 ticks. Of these ticks, 367 (95.6%) and 5 (1.3%) were confirmed as I. scapularis and I. dentatus, respectively. These data show a drastic shift in species composition over the last 15 years, as only I. dentatus was

detected from songbirds mist netted from 2004-2009 in the recreation area. Results of infection with B. burgdorferi will be forthcoming. Past data, as well as what has been seen thus far in the 2018 and 2019 season, show that the increase in I. scapularis on songbirds collected during the migratory season at FCTC may reflect birds spreading locally established ticks that have become more abundant over the last decade.

SLAMF7 INTERACTIONS BETWEEN TUMOR-ASSOCIATED MACROPHAGES AND T CELLS ORCHESTRATE T CELL EXHAUSTION

Sean Hyslop

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 602
Mentor(s): Yasser Aldhamen (MICROBIOLOGY & MOLECULAR GENETICS)

Cancer immunotherapies targeting checkpoint inhibitors such as PD-1 have resulted in improved anti-tumor responses and prolonged patient survival in some cancers, yet many patients do not respond or relapse soon after therapy. Research into the mechanisms regulating checkpoint pathways is thus imperative in improving patient outcomes. Our lab focuses on understanding the function of SLAMF7 in immune cells and the tumor microenvironment. SLAMF7 is a homotypic member of the signaling lymphocytic activation molecule (SLAM) family of receptors and is expressed at differing frequencies on immune cells. We previously demonstrated that SLAMF7 modulates both innate and adaptive immune responses. Importantly, similar to blockade of PD-1, blockade of SLAMF7 augmented NK, dendritic, and T cell responses. To understand the impact of SLAMF7 signaling in cancer patients, we analyzed outcomes from The Cancer Genome Atlas (TCGA) and a cohort of patients with renal clear cell carcinoma and found that SLAMF7 expression might predict disease severity, as patients with high tumor biopsy mRNA expression of SLAMF7 had significantly reduced disease-specific survival. Surface expression of SLAMF7 evaluated by CyTOF also correlated strongly with an exhausted T cell signature. Further investigation revealed that SLAMF7 signaling in T cells upregulates the co-inhibitory receptors PD-1, LAG-3, Tim-3, 2B4, and CTLA-4. Importantly, intratumoral T cells derived from SLAMF7-/- mice express lower levels of these receptors, compared to cells from WT mice. These results implicate SLAMF7 as an important modulator of anti-tumor immune responses and a novel target for immunotherapy.

THE STAPHYLOCOCCUS AUREUS GISABCD ABC TRANSPORTER FACILITATES USE OF HOST-DERIVED GLUTATHIONE AS A SULFUR SOURCE

Jack Dodson

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 603
Mentor(s): Joshua Lensmire (MICROBIOLOGY & MOLECULAR GENETICS), Neal Hammer (MICROBIOLOGY & MOLECULAR GENETICS)

Antibiotic resistant pathogens cause considerable mortality. One promising avenue for therapeutic intervention is targeting the systems that pathogens utilize to obtain essential nutrients during infection. Staphylococcus aureus is an important human pathogen due to its ability to cause a multitude of diseases and rapidly develop resistance to antibiotics. During infection, S. aureus is restricted to nutrients present in the host environment to support proliferation. This work focuses on identifying mechanisms S. aureus employs to satisfy its sulfur requirement. Previous studies have shown that in vitro, S. aureus utilizes the tripeptide glutathione (GSH) as a source of sulfur. This fact supports the hypothesis that S. aureus targets host-derived GSH as a source of sulfur during infection. To investigate host GSH exploitation by S. aureus, we demonstrate that S. aureus can utilize either GSH or GSSG

as a sulfur source. Next, we isolated five mutants that fail to proliferate when GSSG is supplemented in the growth medium as the sole source of sulfur. The mutant strains proliferate when cystine is added to the medium, but also fail to grow when micromolar concentrations of GSH are supplemented to the medium. In keeping with these results, we named this transporter the glutathione import system or gisABCD. Current work seeks to delineate the activity of the Gis proteins and determine whether the Gis system facilitates sulfur acquisition during infection. These experiments have the potential to validate Gis-mediated sulfur acquisition as a therapeutic target for the treatment of staphylococcal infections.

CREATION OF A MOCK COMMUNITY AS A POSITIVE CONTROL FOR MICROBIAL DNA EXTRACTION FROM SEED

Joanna Colovas

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 604
Mentor(s): Ari Bintarti (PLANT, SOIL & MICROBIAL SCIENCES), Ashley Shade (MICROBIOLOGY & MOLECULAR GENETICS)

Plant seeds have low biomass of microbes, as well as low microbial community diversity. This may present problems when extracting DNA from seed microbes. When extracting DNA from seed, a positive control and a negative control must be used; commonly, these are a known source of bacterial DNA, and a known sterile buffer used in extraction, respectively. These controls ensure that the DNA extraction has been successful, and, if there is no bacterial DNA present in a sample, it is because the sample is microbe-free and not due to a faulty DNA extraction. One source of a positive control is to use a mock bacterial community with a known composition of members. Mock communities can be purchased, but they are very expensive. An alternative is to create a mock community from strains grown in the lab. Ideally, a mock community should contain several representatives of taxa that are expected from a sample and should also include taxonomic breadth to ensure that the cells of the major microbial lineages and cell types are sufficiently lysed during extraction. In this case, our community is a mock for seed DNA extractions, therefore, it should resemble the bacterial and fungal phyla commonly found associated with plants, such as Firmicutes and Actinobacteria. Here we assembled a mock community of common bacterial and fungal strains and tested its efficacy in DNA extraction at different concentrations. Once optimized, this mock community will be used as a positive control for seed microbiome DNA extraction.

BACTERIAL PHYSIOLOGY ACCOMPANYING PHAGE RESISTANCE IN THE OPPORTUNISTIC PATHOGEN PSEUDOMONAS AERUGINOSA

Allison Kennedy

Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 605
Mentor(s): Jonathan Hardy (MICROBIOLOGY & MOLECULAR GENETICS)

This study investigates the bacterial physiology that accompanies page resistance in Pseudomonas aeruginosa. P. aeruginosa is an opportunistic pathogen commonly found infecting the lungs of people suffering from cystic fibrosis. This pathogen forms biofilms in the lung, causing difficulty breathing, and can be very difficult to eliminate successfully due to its wide range of metabolites that act as virulence factors. Several strains of P. aeruginosa including phage resistant variants were analyzed using mass spectrometry to quantify their pyocyanin production, biofilm formation of different strains was observed after growth in liquid culture, and morphology was observed on motility plates. Phage resistant variants are

of interest when considering proposed phage therapy for P. aeruginosa infections in cystic fibrosis patients.

IDENTIFYING THE CYCLIC DI-UMP SYNTHASE IN SACCHAROMYCES CERIVISIAE

Marius Marcel Toni Karbach
Microbiology, Immunology, and Infectious Disease, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 606
Mentor(s): Christopher Waters (MICROBIOLOGY & MOLECULAR GENETICS)

For the survival, coordinated proliferation, and growth of microorganisms, adapting to changing conditions in their environment as well as reacting to signals from other members of their community is indispensable. A common means by which this type of signal transduction may occur involves second messenger systems. Many second messengers are derived from ribonucleotides, including the cyclic di-nucleotides (cDN). cDNs are more recently discovered signaling molecules, but it is evident from evolutionary conserved examples like cyclic GMP-AMP, that they are responsible for the transduction of a vast variety of signal-reaction pathways across both prokaryotes and eukaryotes. All known cDNs so far are derived from the purines adenine and guanine. In searching for novel cDNs made by bacteria, we discovered that yeast extract contains high concentrations of the cDN cyclic di-UMP (c-di-UMP) and subsequently demonstrated that c-di-UMP is synthesized in the yeast S. cerevisiae in response to heat-shock. However, the genes involved in the synthesis, transduction, and other mechanisms of c-di-UMP signaling are completely unknown. This project aims to take the first step into unravelling these mechanisms by identifying genes involved in the production of c-di-UMP, thereby opening the door for further research into this first pyrimidine-based cDN and first cDN discovered in yeast. For this, we have predicted five genes in collaboration with bioinformaticians from the NIH that may encode the c-di-UMP synthase. I am testing each of these genes for the ability to synthesize c-di-UMP by overexpressing them in the heterologous host Escherichia coli and deleting them in S. cerevisiae.

THE BIGGER YOU ARE THE FITTER YOU ARE: CELL SIZE AND FITNESS INCREASES DURING 50,000 GENERATIONS OF EVOLUTION IN A LONG-TERM EVOLUTION EXPERIMENT WITH ESCHERICHIA COLI.

Ali Abdelmagid
Microbiology, Immunology, and Infectious Disease, Oral Presentation
Section: 6, 11:00 AM
Presentation Number: 866
Mentor(s): Nkrumah Grant (MICROBIOLOGY & MOLECULAR GENETICS), Richard Lenski (PLANT, SOIL, AND MICROBIAL SCIENCES)

In a long-term evolution experiment (LTEE) with Escherichia coli, 12 lineages founded from the same ancestor have evolved in parallel within a common environment for >73,000 generations. During this period, fitness in this environment has increased continuously. 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 sought to determine if cell size has continued to increase with fitness after 10,000 generations. To this end, we revived frozen samples of bacteria from the 12 LTEE lineages isolated from 2,000, 10,000 and 50,000 generations, and measured cell size using volumetric and microscopic methods. We measured cell sizes of whole population samples and individual clones isolated from each lineage. Our results showed idiosyncratic cell size increases in the clonal samples, whereas whole population samples showed a consistent increase in cell size over 50,000 generations. Our microscopic analyses also revealed interesting cell morphology. On average, most lineages evolved wider cells at earlier

generations and then longer cells at later time-points. We also observed the evolution of spherical cells, an atypical shape for E. coli, and identified a potential genetic determinant for this phenotype. Moreover, we found a strong positive correlation between fitness and cell size, suggesting that cell size and fitness are still tightly coupled. Our results sheds light on the impact cell size and shape have on organismal fitness and supports theory relating these morphological features to the complexity within biological systems.

DECONTAMINATION STRATEGIES FOR AQUATIC ENVIRONMENTAL MICROBIOMES ON VERTEBRATE BONE SURFACES: APPLICATIONS FOR FORENSICS

Emily Nestle

Microbiology, Immunology, and Infectious Disease, Oral Presentation
Section: 6, 11:15 AM
Presentation Number: 867
Mentor(s): Mark Benbow (ENTOMOLOGY)

Microbes are ubiquitous and play important roles across habitats. These communities of microorganisms aid in organic matter decomposition, as seen with carrion. Like other ecological communities (e.g., transition of pioneer plants to a mature forest), the postmortem microbiome undergoes successional changes after host death. These predictable patterns of microbial community turnover during decomposition can be used to model the postmortem interval (PMI) estimate, or time since death in forensics. However, further research is needed to determine how accurate these PMI estimates are in various conditions and systems, such as an aquatic environment. In this experiment, we sought to determine the most effective surface decontamination method for decomposing pig bones in an aquatic habitat, which will inform downstream methodology for determining microbial succession from internal bone microbiomes. Twelve pig (Sus scrofa domesticus) vertebrate bones from five carcasses were submerged in a freshwater lake for 14 months (Aug 2018- Oct 2019) and decontaminated with three sterilization treatments: chemical (one and five minute submersion soak), mechanical, and a combination of chemical and mechanical treatments (with one and five minute submersion soaks). Total DNA was extracted and then quantified to determine effectiveness of decontamination. The presence of microbial DNA was determined using targeted PCR of the 16S rRNA V4 region. Preliminarily, the five-minute combination treatment was proven most effective as all Qubit DNA Quantifications were <0.5 ng/uL, with no observed amplification of bands in PCR. With this information, proper decontamination can be ensued to accurately isolate internal bone microbiomes in determining PMI.

GARDENING AND ITS INFLUENCE ON THE COMPOSITION OF GARDENERS' GUT MICROBIOME AND PRESENCE OF ANTIBIOTIC RESISTANCE GENES

Sarah Keller

Microbiology, Immunology, and Infectious Disease, Oral Presentation
Section: 6, 11:30 AM
Presentation Number: 868
Mentor(s): Katherine Alaimo (FOOD SCIENCE & HUMAN NUTRITION), Sarah Comstock (FOOD SCIENCE & HUMAN NUTRITION), Alyssa Beavers (EXTERNAL MENTOR)

The body isn't solely composed of human cells. It includes an abundance of bacteria, fungi, and viruses that complete each individual's total cell repertoire. Whether the microbes are inside of the body or out, they are all critical to human health. While genetics have an influence on the gut microbiota composition, environmental factors are most influential to its development. The overall goal of our research is to understand how environmental exposures influence human health through changes to microbiomes. The objective of this research is to determine how soil exposure, through regular gardening, alters an individual's gut bacteria and the presence of antibiotic resistance genes (resistome) in those bacteria. Soil is a good medium because it contains a myriad of microorganisms. Additionally, an abundance of

antibiotic resistance genes can be found in soils mixed with animal manure. Participants provided three fecal samples at different time periods throughout the study. DNA was extracted from both fecal and soil samples using the Qiagen DNAEasy Powersoil Kit. PCR was conducted to amplify the V4 region of the 16S rRNA gene of all samples following the mothur wet lab standard operating procedure. DNA extracted from soil and stool samples are to be analyzed for the presence of antibiotic resistance genes by the quantitative real-time polymerase chain reaction using the SmartChip Analysis System at the MSU Genomics Core. The results of this research will allow the examination of how routine exposure to soil influences the composition of the gut bacteria and resistome in gardeners.

RAPID POINT-OF-CARE TESTING FOR SEXUALLY TRANSMITTED INFECTIONS AND VACCINE BENEFITS

Madi Corda
Microbiology, Immunology, and Infectious Disease, Oral Presentation
Section: 6, 11:45 AM
Presentation Number: 869
Mentor(s): Brett Etchebarne (OSTEOPATHIC MEDICAL SPECIALTIES)

Sexually transmitted infections (STIs) afflict populations across the globe. They are transferred from person-to-person during vaginal, oral, and anal intercourse and even skin-to-skin contact. They can manifest differently in males and females but are generally characterized by itching, inflammation, pain, and burning around the genitalia, painful urination, and genital lesions. My project is a part of a longitudinal study continuously collecting data to assess the prevalence of STIs afflicting women in the developing country of Peru. I used gel Polymerase Chain Reaction (PCR) to determine the disease prevalence of seven pathogens that commonly cause STIs. Secondly, I ran loop-mediated isothermal amplification (LAMP) to compare the diagnostic results to PCR, the gold standard, to determine LAMP's accuracy, since it is a faster tool and could potentially yield more efficient diagnosis and treatment of such infections. The STI panel includes detection of Neisseria gonorrhea and Gardnerella vaginalis which produced a combined sensitivity of 20.14% and a specificity of 97.22%. Despite previous data that supports LAMP, these unfavorable values led to troubleshooting to determine the need for different combinations of DNA primers to yield the ideal results that we know LAMP is capable of. The prevalence of disease in Trujllo, Peru shows much greater values for bacterial STIs, such as Gardnerella vaginalis with a 59.7% prevalence in our sample set, versus viral, like Human Papilloma Virus (HPV) with a prevalence of 2.76%. Whether this data is significant enough to support the implementation of HPV vaccination for women is beyond my scope.

CHARACTERIZATION OF CRISPR ELEMENTS IN E. AMYLOVORA FROM A SINGLE HIGH DENSITY APPLE ORCHARD IN MICHIGAN

Jerimiah Johnson
Microbiology, Immunology, and Infectious Disease, Oral Presentation
Section: 6, 12:00 PM
Presentation Number: 870
Mentor(s): George Sundin (PLANT, SOIL, AND MICROBIAL SCIENCES)

Fire blight, caused by the bacterium Erwinia amylovora, is a devasting disease of apple and pears in Michigan. Though this disease is found in most major fruit production areas of the world, it is thought to have originated in the Eastern United States. The population of E. amylovora is thought to be relatively homologous, with only slight differences between strains. To differentiate strains, amplification of the bacterial CRISPR (clustered regularly interspaced short palindromic repeats) regions are used to type strains based on previous encounters with phage, plasmids, and other foreign DNA that create unique patterns in between spacer regions. Using CRISPR regions, antibiotic resistance, and VNTR (Variable

Nucleotide Tandem Repeats), bacterial isolates can be identified and mapped back to the trees they were collected from in orchards. Over the 2018 and 2019 growing season, 300+ E. amylovora isolates were collected from a heavily infected commercial apple orchard in Northwest Michigan. Each tree was also rated for disease incidence in both years. By measuring resistance to the antibiotic streptomycin and amplifying the CRISPR and VNTR regions of each isolate, a map of were the strains were located in the orchard was made for both years and the strains could be tracked through the orchard. At least 6 unique strains were discovered in the orchard and the surrounding area. The use of strain maps can help researchers track antibiotic resistance movement through an orchard and help make recommendations to growers regarding disease management.

NEUROSCIENCE

UNDERSTANDING AND INVESTIGATING FORMATION OF NEURAL CIRCUITS IN THE ENTERIC NERVOUS SYSTEM IN ZEBRAFISH USING THE GAL 4-UAS SYSTEM

Olivia Duru

Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 49
Mentor(s): Helen Rueckert (INTEGRATIVE BIOLOGY), Julia Ganz (INTEGRATIVE BIOLOGY)

The purpose of this research study is to investigate the formation of neural circuits in the enteric nervous system (ENS). The ENS is also called the brain in the gut because it can work independently from the central nervous system. It is a part of the autonomic nervous system, which regulates many different gut functions, such as digestion, blood flow, mucosal transport, secretion, and immune functions. However, how neural circuits form in the ENS is poorly understood. To label neural circuits in the easily accessible zebrafish ENS, I will use the Gal4 driver line-UAS reporter line system. Single neurons can be labeled by mosaic expression of UAS-membrane-bound GFP in a Gal4-driver line that expresses Gal4 in ENS neurons. At 5 days, I will image entire guts containing isolated GFP positive ENS neurons using a spinning disk microscope. I will be able to classify imaged neurons based on position, morphology, and projection patterns. I will determine their neurochemical profile using immunohistochemistry against neurochemical subtypes. To further my research, I will combine the Gal4 driver line with transgenic lines that label specific cell types within the gut to see how my labeled neurons connect to these different cell types within the gut. This work will be a first step to understand the neural circuit formation in the ENS and which cell types in the gut are innervated by which ENS neurons. This will also increase our knowledge about how the enteric nervous system communicates with cells in the gut.

DEVELOPING A RODENT MODEL OF REALITY TESTING USING PAVLOVIAN LEARNING PROCEDURES COMBINED WITH OPTOGENETIC AND PHARMACOLOGICAL MANIPULATIONS OF DOPAMINERGIC CIRCUITY

Nathan Pence

Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 50
Mentor(s): Alexander Johnson (PSYCHOLOGY), Ben Fry (PSYCHOLOGY)

Hallucinations and delusions are core symptoms of numerous neuropsychiatric conditions, including schizophrenia, and are thought to reflect impaired reality testing—difficulties in distinguishing internal ideas from external reality. In humans, disruptions in dopamine (DA) have long been attributed to the pathophysiology associated with these symptoms, and treatment strategies (i.e., antipsychotics) work by blocking the actions of the DA D2 receptor.

Nevertheless, 10-30% of patients show treatment resistance to neuroleptics, whereas those successfully treated often suffer from unintended severe side effects. This is in part due to a lack of understanding of the detailed neurobiology underlying these symptoms, an outcome further perpetuated by the idea that hallucinations and delusions are a uniquely human phenomenon. Here we present an animal model of reality testing that employs Pavlovian learning procedures in which an auditory conditioned stimulus (CS+) led to the delivery of a sucrose reward. Afterwards, the CS+ was paired with illness and under certain conditions mice attributed the illness not with the CS+ (i.e., external reality) but with the sucrose reward (i.e., internal idea). Moreover, this effect was aggerated in males, potentiated by optogenetic stimulation of dopamine cells, and was ameliorated by prior administration of the antipsychotic, haloperidol. Overall, these findings are consistent with: (1) enhanced prevalence of schizophrenia in males, (2) sensitivity to treatment with antipsychotics, (3) the important role of dopamine in modulating reality testing.

SEX DIFFERENCES IN THE ACTIVATION OF THE BED NUCLEUS OF THE STRIA TERMINALIS IN JUVENILE MALE AND FEMALE RATS

Haley Velisek
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 51
Mentor(s): Alexa Veenema (PSYCHOLOGY), Katie Yoest (PSYCHOLOGY)

The bed nucleus of the stria terminalis (BNST) is involved in the regulation of many behaviors including social investigation. Using rodent models, it has been shown that the BNST is involved in social investigation in adults. This effect is sex specific, in part due to sex differences in neurotransmitter release and receptor density within the BNST. However, the role of the BNST in juvenile social investigation is poorly understood. Exploring sex differences in neural circuitry underlying these behaviors can indicate why neuropsychiatric disorders that involve impairment in social function differ between the sexes. We sought to determine if there are sex differences in the activation of the BNST following social investigation in juvenile rats. In order to determine the activation in the BNST we measured the expression of the immediate early gene cFos. Expression of cFos protein reaches peak levels 90 minutes after a cell is activated. By examining cFos levels in juvenile male and female rats that were exposed to a social stimulus or left alone in their home cage we can determine if there are sex and stimulus dependent differences in activation of the BNST. We observed a significant increase in cFos expression in the anterior BNST and a trend toward increased activation of the posterior BNST following social investigation in females but no effect of social investigation on BNST activation in males. This study provides new insights into the neural basis of social investigation by demonstrating social investigation-induced sex-specific activation of the BNST.

THE EFFECT OF VARIED LEVELS OF ATTENTION ON THE MAGNITUDE OF THE PUPIL CONSTRICTION RESPONSE TO ISOLUMINANT CHANGES IN COLOR AND COHERENT MOVEMENT OF A STIMULUS.

Matthew Zadel
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 52
Mentor(s): Jan Brascamp (PSYCHOLOGY)

The pupil is known to change its size in response to three distinct kinds of stimuli. The pupil dilates in response to increased cognitive activity, such as increased levels of arousal or mental effort. The pupil constricts in response to brightness and in response to fixation on a near object. However, previous studies have also demonstrated small transient pupil

constrictions in response to isoluminant changes in color and coherent movement of a stimulus. Unlike the distinct aforementioned pupil responses, not much is known about the constriction response attributed to a uniform change in color and direction of motion of a stimulus. Nonetheless, it is known that a steady-inhibition from a number of cortical areas to the Edinger-Westphal (EW) nucleus ensures that the pupil size remains normal by reducing the strength of the signal from the EW nucleus to iris sphincter muscle. Therefore, this constriction response has been used as an indication of differences in cortical processing. To investigate this pupil response as a cortical process, we used eye tracking and two separate conditions of a computer task (high attention and low attention) to examine how the extent of attention directed to the translational change in motion and change in color modulates the magnitude of observed pupil constriction. In both conditions, the predicted pupil constrictions were observed and it is expected that if this pupil response is a cortical process that the magnitude of the pupil constriction response will be dependent on the extent of attention paid to the stimulus change.

USING DEEPLABCUT FOR 3D MARKERLESS POSE ESTIMATION IN HUMAN INFANTS.

Esin Ural, Neil Potdukhe, Samantha Finkbeiner

Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 53
Mentor(s): Rebecca Knickmeyer (PEDIATRICS & HUMAN DEVELOPMENT)

Infancy is a key period in the development of fear, an essential emotion that involves recognizing and responding to threatening stimuli. Researchers studying the development of fear in infancy rely on both parental reports, which can be highly subjective, and direct assessment of child behavior either in the home or in structured laboratory settings. The objective of the current study is to develop more automated approaches to the assessment of infant behavior, including fear behavior. Specifically, we are testing whether a program called DeepLabCut can effectively track infants' reactions when presented with a series of Halloween masks. DeepLabCut is a relatively new method for 3D markerless pose estimation based on transfer learning with deep neural networks. It allows users to track key features, such as the eyes, nose, shoulders, hands, and feet, as they move through space. Videos were collected by a research team at the University of North Carolina at Chapel Hill studying relationships between infant fear reactivity and the gut microbiome. Our research team at MSU has developed detailed instructions for labelling key features (a prerequisite for training the neural network) and are currently performing a test of inter-rater reliability. After we have established inter-rater reliability, we will test if the duration of an infant's visual attention to the fearful stimulus correlates with the infant's fear reactivity as assessed by an expert human rater. Ultimately, we hope to develop user-friendly methods of assessing highly complex infant behaviors, which could be deployed to a wide range of research labs.

SEX DIFFERENCES IN SOCIAL RECOGNITION DEVELOPMENT: ROLE OF ESTRADIOL IN JUVENILE FEMALE RATS

Morgen Henry

Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 54
Mentor(s): Alexa Veenema (PSYCHOLOGY), Katie Yoest (PSYCHOLOGY)

In mammals, social decision-making is largely dependent on recognition of novel or familiar peers. Our lab found that juvenile female rats do not display social recognition whereas adult females and juvenile and adult males do. We hypothesized that juvenile females lack social recognition because the brain mechanism for this process requires increased estrogen levels found post-puberty. To test this, we injected juvenile female rats with estradiol benzoate (EB)

or vehicle 48-hours prior to social discrimination testing. Testing entailed a four-minute exposure to a same-sex conspecific (Trial 1), a thirty-minute inter-trial interval, and another four-minute exposure to both the original stimulus and a novel conspecific (Trial 2). Social recognition was defined as the preference for the novel vs. familiar conspecific. EB increased social investigation during Trial 1, suggesting that EB facilitates social motivation. EB induced a preference for the familiar animal during Trial 2, suggesting that EB promotes social recognition by inducing a preference for a familiar animal. We then tested female rats over the course of development. The proportion of females showing social recognition increased through development, but, collectively, females did not show social recognition at any age. We simultaneously tracked the ovulatory cycle of post-pubertal females to determine if ovarian hormones influenced social recognition ability. We found that females in proestrus/estrus showed social discrimination, while females in metestrus/diestrus did not, indicating that increased ovarian hormones during estrus may improve social recognition in post-pubertal females. These results provide insight into the neurobiological mechanisms underlying social recognition in developing female rats.

ELECTROPHYSIOLOGICAL PROPERTIES OF STRIATAL SPINY PROJECTION NEURONS IN A PRENATAL VALPROIC ACID MOUSE MODEL OF AUTISM

Madison Haynes
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 55
Mentor(s): Charles Cox (PHYSIOLOGY), Joseph Beatty (PHYSIOLOGY)

Autism is a developmental disorder that is often associated with hyperactivity, social phobia, impaired cognition, and repetitive/compulsive behaviors. The prenatal valproic acid (VPA) mouse model is a non-genetic model of autism that recapitulates many of the behaviors seen in autistic patients. Striatal circuity has been implicated in voluntary motor control/learning and its dysfunction is linked to repetitive/compulsive behaviors; however, few studies have electrophysiologically investigated spiny projection (SP) neurons of the striatum in the VPA mouse model of autism. To induce autism, pregnant mice were injected with either 600 mg/kg of VPA or saline subcutaneously at embryological day 13 and allowed to deliver the pups to term. Once these pups reached three months of age they underwent repetitive behavior testing. Mice prenatally treated with VPA displayed increased repetitive behavior when compared with prenatal saline treated controls. Following behavioral testing brain slice electrophysiological recordings were performed on both prenatal VPA and saline treated mice. Whole-cell current clamp recordings were used to measure resting membrane potential, apparent input resistance, membrane time constant, and rheobase of SP neurons. The only intrinsic property that was significantly different was rheobase which showed a decrease ($p < 0.05$) in the VPA mice compared to the saline mice. We also compared the frequency of action potential firing versus current relationship and observed a decrease in maximal firing rate for the VPA mice compared to the saline mice. Together, these results suggest a hypo-activity of SP neurons in prenatally treated VPA mice and therefore a reduced output of the striatum.

MODELING OF FLUID TRANSPORT IN THE BRAIN

Shay Ladd
Neuroscience, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 56
Mentor(s): Christina Chan (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Neil Wright (MECHANICAL ENGINEERING)

The flow of cerebrospinal fluid (CSF) and interstitial fluid (ISF) from the ventricles of the brain to the lymph vessels of the subarachnoid space may be tied to the clearance of waste products in the brain. Inflammatory cytokines are elevated during neuroinflammation, which has been tied to impaired waste clearance from the brain. It is unknown if cytokines alter the transport and clearance of waste products. Given the complexity of the brain, computational modeling may provide improved understanding of processes that are altered as the environment changes. Models can be used to assist in the development of in vitro and in vivo experiments to more efficiently use resources. The project will model CSF flow in the brain to elucidate how elevated levels of cytokines alter the transport and clearance of wastes from the brain through the CSF and ISF. A simplified model of the flow of ISF and CSF in the brain uses spherical geometry. This model is solved analytically to provide greater insight into the sensitivity of the flow to various parameters. It also providesverification for more anatomically realistic numerical models. Baseline coefficients and boundary conditions have been measured by our collaborator. A finite element model is then created with the more complex geometry of human and rodent brains. This model will be used to guide future experiments in rodents by identifying the factors with greatest influence on waste clearance. The results will be used to predict outcomes in humans.

ELECTROPHYSIOLOGICAL AND MORPHOLOGICAL PROPERTIES OF MOUCE THALAMIC RELAY NEURONS OF THALAMIC RETICULAR NEURON (TRN) POPULATIONS

Kermanjot Sidhu

Neuroscience, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 57
Mentor(s): Charles Cox (PHYSIOLOGY), Joseph Beatty (PHYSIOLOGY)

The thalamic reticular nucleus (TRN) is a thin layer of inhibitory neurons that borders the dorsal thalamus and receives innervation from both thalamic relay and corticothalamic neurons. This configuration allows the TRN to play a key role in the modulation of sensory information as it is relayed from thalamus to cortex or from cortex to thalamus. Neurons of the TRN characteristically produce a high-frequency transient discharge of action potentials at hyperpolarized membrane potentials called a burst; however, the presence of a smaller subset of neurons that do not produce this burst discharge indicates heterogeneity amongst TRN neurons. Our recent studies have revealed a third population of slowly-bursting neurons within the TRN that we hypothesize may result in shorter, phasic inhibitory drive onto thalamic relay neurons. We aimed to determine whether these slowly-bursting neurons are electrophysiologically and morphologically different than previously described bursting and non-bursting TRN neurons. To accomplish this, we performed whole-cell intracellular recordings of TRN neurons in mouse brain slices coupled with posthoc anatomical measurements of cellular morphology. Slowly-bursting neurons displayed significant differences in action potential firing frequency, action potential half-width, and spike number per burst discharge. Initial results do not indicate significant morphological changes, however, a greater number of analyzed neurons will be necessary to confirm this result. With these findings, we suspect that the TRN may contain a more heterogeneous neuron population than previously thought, with potentially distinct functional roles.

EFFECTS OF PREDATOR STRESS ON BRAIN MAST CELLS

Sonia Khalid

Neuroscience, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 58
Mentor(s): Adam Moeser (LARGE ANIMAL CLINICAL SCIENCES), Alfred Robison (PHYSIOLOGY), Natalia Duque-Wilckens (LARGE ANIMAL CLINICAL SCIENCES)

Mast cells (MCs), multifunctional innate immune cells mostly known for their role in peripheral disease such as allergy, are also present in the central nervous system. MCs have the capacity to release a wide range of pharmacologically active mediators which allow them to not only orchestrate immune responses, but also modulate the activity of vascular and lymphatic endothelial cells, nerves, and glia, suggesting that they could have a key role in brain physiology and behavior. Studies in humans with mast cell-associated diseases, as well as animal studies using mast cell deficient mouse lines, suggest that MCs could regulate anxiety behaviors, but the underlying mechanisms are not understood. Using a CMA1-Cre-GFP mouse line to express green fluorescent protein specifically in MCs, we aimed to determine whether brain MCs are affected by exposure to predator stress - a widely used model for stress-induced anxiety-like behaviors. Compared to controls, mice exposed to predator stress showed reduced time spent in open arms in the elevated plus maze, indicating an anxiogenic effect of stress. Qualitative analysis showed that GFP+ cells were distributed in brain areas associated with anxiety responses such as hypothalamus and hippocampus in both control and stressed animals. Ongoing studies are assessing if exposure to stress affects hippocampal MCs number, distribution, morphology and interaction with glial cells. This work will generate a new understanding of the potential role of MCs in mediating stress-induced changes in brain function driving anxiety-like behavior.

INVESTIGATING THE ROLE OF CANDIDATE GENES IN REGULATING NEURONAL DIFFERENTIATION IN THE ZEBRAFISH ENTERIC NERVOUS SYSTEM

Christina Liu

Neuroscience, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 59
Mentor(s): Julia Ganz (INTEGRATIVE BIOLOGY)

The enteric nervous system (ENS) is the largest branch of the peripheral nervous system, innervates the gut, and can function independently from the central nervous system. It regulates gut functions including motility, fluid transport, and nutrient absorption. The ENS is derived from the neural crest—a migratory cell population that gives rise to specialized cells. Once neural crest cells reach the gut, they colonize the gut and migrate to the distal end. Once colonized, enteric progenitor cells differentiate into neurons and glial cells. Abnormal ENS development can result in diseases like Hirschsprung Disease. Little is known regarding the regulation of differentiation and specification of neurons in the ENS. This project aims to understand the function of two candidate genes, dlx1a and jarid2, in regulating ENS neurogenesis. Preliminary data using CRISPR/Cas9 shows that functional loss of dlx1a and jarid2 reduces neurons and affects specific neuronal subtypes, suggesting that dlx1a and jarid2 play a role in neuronal differentiation and specification. We are currently establishing stable mutants for both genes. For this, I am genotyping F1 zebrafish that may carry different mutations in dlx1a or jarid2. To determine if dlx1a or jarid2 control neuronal specification, I am investigating neuronal phenotype in loss-of-function of dlx1a or jarid2. For this, I am imaging guts that are stained with antibodies against a pan-neuronal marker and markers of different neuronal subtypes and quantify neuron numbers and neuronal subtypes. The results will help uncover novel regulators of ENS neurogenesis and develop approaches to remedy ENS diseases.

INFLUENCE OF TRIAL REPETITION ON STRUCTURAL LEARNING

Akshay Seenivasan, Alexis Yang, Brooke Chmiel, Carolyn Springer, Omar Abulibdeh, Taylor Porter

Neuroscience, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 60
Mentor(s): Florian Kagerer (KINESIOLOGY)

Previous research in visually guided reaching has shown that learning random perturbations belonging to the same structure facilitates adaptation to a novel, fixed perturbation of the same structure. Usually the perturbations are not truly random, but repeat across targets. Currently, it is not known how the number of repetitions of the same perturbation affects structural learning. We exposed participants to a structure where each of two targets was presented either two times with a particular visuomotor rotation, or eight times, before a new rotation was applied. We then exposed the same hand to a fixed perturbation of the same structure. We hypothesized that with only two repetition per target the structural learning advantage would be abolished and not lead to better learning of the subsequent fixed perturbation. Right-handed participants were randomly assigned to one of two groups; they performed a center-out reaching task using a KINARM endpoint robot to two fixed peripheral targets. Participants controlled a virtual cursor on a screen that occluded vision of the hand. Following a veridical feedback baseline, participants experienced an exposure phase. One group experienced a new random rotation in visual feedback every 2 trials (1/target) while the other group experienced a new random rotation every 8 trials (4/target). All participants then performed the task using the same hand with exposure to a fixed 40 degree rotation. Adaptation was measured using initial directional error (IDE), normalized root-mean squared error (RMSE), movement time (MT), and movement length (ML).

LONGITUDNAL CHANGES IN HIPPOCAMPAL SUB-REGIONAL VOLUMES IN NORMAL AGEING

Jamie Satow, Keilyn Broussard, Timothy Chalom
Neuroscience, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 61
Mentor(s): Andrew Bender (EPIDEMIOLOGY AND BIOSTATISTICS)

The hippocampus is an important brain structure for learning and memory. Prior studies show declines in hippocampal volume in normal aging and age-related neurodegenerative diseases. In addition, volumes of functionally and anatomically distinct hippocampal subregions are more sensitive markers of aging and memory than total volume. However, very few studies have evaluated changes in subregional hippocampal volumes over time, and none have used the most well-validated methods. We performed semi-automated segmentation of hippocampal subfields on high-resolution MRI data from the Alzheimer's disease neuroimaging initiative (ADNI) and Berlin Aging Study-II (BASE II) imaging cohorts. All data were bias-corrected and intensity normalized before a trained rater (KB) manually determined the spatial extent of the hippocampal body using established anatomical landmarks: anterior hippocampal body was determined by the first slice following the uncal apex while end of body was the final slice that included the lamina quadrigemina. These data will be incorporated with our lab's customized segmentation atlases using the Automated Segmentation of Hippocampal Subfields (ASHS) on MSU's High Performance Computing Cluster. This approach will be used to automatically segment data into four regions of interest including entorhinal cortex and three hippocampal subregions: subiculum, CA1-2, and CA3/dentate gyrus. The resulting longitudinal volumetric data will be used to model changes in subregional hippocampal volumes over time and their contribution to age-related declines in learning and memory.

SEX AND STRESS EFFECTS ON GENE EXPRESSION IN A MODEL OF POST-TRAUMATIC STRESS DISORDER IN RATS

Hayley Kuhn
Neuroscience, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 62

Mentor(s): Andrew Eagle (PHYSIOLOGY)

Post-traumatic stress disorder (PTSD) is a psychiatric disorder that stems from exposure to a traumatic stressor and leads to a dysregulated stress response. Women are twice as likely to develop PTSD than men. Women also tend to experience different symptoms from men, which may underlie a differential response to stress. However, the neurobiological mechanism for this sex difference is poorly understood. Single prolonged stress (SPS) is a rodent model that involves multiple stressors and produces behavioral and physiological PTSD-like phenotypes. The glucocorticoid receptor (GR) expression and the bone-derived neurotrophic factor (BDNF) signaling pathway are critical in the stress response. SPS alters GR and elicits BDNF dysfunction in key brain regions that are dysregulated in PTSD, including the hippocampus (HPC), amygdala (Amy), and prefrontal cortex (PFC). We have shown differential alterations in behavior and GR across sexes. These mechanisms may underlie the sex differences we observe in clinical PTSD. To test this hypothesis, male and female rats were exposed to SPS, then BDNF and GR gene expression were measured in the HPC, Amy, and PFC. We found both sex and stress effects on gene expression in these brain regions. This suggests that SPS dysregulates GR and BDNF in a sex-specific manner which may underlie differential behavioral and physiological PTSD phenotypes. Moreover, these findings may explain why we observe sex-specific differences in clinical PTSD.

MAST CELL-MICROGLIA INTERACTION AS A POTENTIAL MECHANISM UNDERLYING ANXIOLYTIC EFFECTS OF MAST CELL DEFICIENCY

Robby Teis
Neuroscience, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 63
Mentor(s): Adam Moeser (LARGE ANIMAL CLINICAL SCIENCES), Alfred Robison (PHYSIOLOGY), Natalia Duque-Wilckens (LARGE ANIMAL CLINICAL SCIENCES)

Mast cells (MCs) are known for their involvement in peripheral diseases such as allergies, but they are also present in the brain where they can modulate behavior. MC deficient KitW-sh/W-sh (sash) mice show increased anxiety-like behaviors compared to wild type (WT) mice, but the underlying mechanisms have not been explored. Here, we assessed the behavior of sash and WT in a battery of tests that include measures of anxiety and motivation including biological sex and psychological stress as variables. There were no effects of stress on WT male or female behavior. Compared to WT, sash mice showed reduced time spent in the open arms of the elevated plus-maze, indicating increased anxiety, in a manner independent of sex or stress. Further, male and female sash mice showed hedonic deficits as measured by a reduced preference for sucrose solution, and this effect was exacerbated by stress. One of the potential mechanisms by which MCs could affect behavior is by modulating the activity of microglia, which are brain-resident immune cells linked to psychiatric disorders. Using immunohistochemistry together with skeletal and fractal analysis, we are currently assessing the microglial distribution and activation levels in the bed nucleus of the stria terminalis, a key area for anxiety behaviors. This work will generate a new understanding of the cellular mechanisms by which mast cells could contribute to both healthy and stressed brain physiology and behavior.

IDENTIFYING A NEURAL PATHWAY THAT REGULATES SOCIAL PLAY BEHAVIOR IN JUVENILE MALE AND FEMALE RATS

Leigha Brown, Valerie Khaykin
Neuroscience, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 219
Mentor(s): Alexa Veenema (PSYCHOLOGY), Christina Reppucci (PSYCHOLOGY)

Juvenile social play is an evolutionarily conserved mammalian behavior that is rewarding and highly motivating. Social play is essential for developing normal cognitive, emotional, and social skills, making social play an important behavior for typical mammalian development. Deficits in social skills are shown in autism spectrum disorder (ASD), a disorder characterized by reduced social play behavior. In order to treat ASD, it is crucial to investigate the neural networks that coordinate social play. We recently found that neurons located in the lateral septum (LS) projecting to the ventral tegmental area (VTA) are activated in response to social play in male and female juvenile rats. Here, we aim to determine if this LS→VTA neuronal pathway is necessary for social play expression. To investigate this, we will inhibit the LS→VTA pathway using inhibitory Design Receptors Exclusively Activated by Designer Drugs (DREADDs). Rats will receive control or DREADD injections into the LS, and will be implanted with guide cannulae targeting the VTA. On test days, rats will receive intra-VTA infusions of the DREADD activator clozapine-N-oxide (CNO) or vehicle. When CNO is infused into the VTA, DREADD-expressing neuron terminals originating from the LS will be inhibited, resulting in inhibition of the LS→VTA pathway. We expect that juvenile rats expressing DREADDs will significantly decrease their social play expression under CNO compared to vehicle, and compared to the control group. This study can provide insights into understanding the neural underpinnings of social play deficits by identifying a potentially crucial neural pathway that regulates social play expression.

ENHANCING CUE SALIENCE AND CONTEXT-INDUCED REINSTATEMENT IN A MODEL OF COCAINE SEEKING IN MICE

Brooklynn Murray
Neuroscience, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 220
Mentor(s): Andrew Eagle (PHYSIOLOGY)

Drug addiction is a serious problem in the US and is characterized by compulsive drug seeking. Drug seeking refers to the craving of drugs that eventually leads to relapse. Dysfunction in brain regions, such as the hippocampus, which is important for memory, and reward regions such as the nucleus accumbens underlie aberrant drug seeking. The hippocampus is particularly important for cued and contextual memory, yet how these memory mechanisms affect drug seeking is unclear. We explored manipulations of cue salience and contextual reinstatement of drug seeking in a mouse model of cocaine self-administration. In one experiment, we assessed whether enhancing the salience of a cocaine-paired cue would increase cocaine self-administration. We found that adding a more salient cue drove more responding for cocaine and higher cocaine intake. We also tested whether we could produce contextual reinstatement of cocaine seeking in mice. We found that mice robustly reinstated to cocaine after previously extinguishing their cocaine responding in a novel context. These findings suggest that cue salience and context are important in producing robust and reliable and robust drug taking and seeking in mice. Furthermore, these findings will lay the foundation for future studies into the role of the hippocampus in context dependent reinstatement of drug seeking.

SOCIAL PLAY BEHAVIOR IN JUVENILE MALE AND FEMALE RATS IS REGULATED BY OXYTOCIN ACTING IN THE NUCLEUS ACCUMBENS

Ann Scazzero
Neuroscience, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 221
Mentor(s): Alexa Veenema (PSYCHOLOGY), Remco Bredewold (PSYCHOLOGY)

Social play is a highly rewarding behavior that is important for the development of social competence in juvenile animals, including children. Social play deficits are seen in autism spectrum disorder (ASD) and schizophrenia, which have a higher incidence in males. 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 (NAc), a brain region important for the regulation of rewarding behaviors. We first determined how OT receptor (OTR) blockade in the NAc regulated social play behavior. Social play was measured by exposing single-housed juvenile rats in their home cage to an unfamiliar age- and sex-matched rat for 10 minutes. We found that administration of a specific OTR antagonist into the NAc significantly decreased the duration of social play in both sexes, but required a higher dose in males. This suggests that males may be less sensitive than females to OTR blockade. Then, we used microdialysis to study how social play and OTR activation altered the release of neurotransmitters in the NAc of male and female juvenile rats. We found that social play increased neurotransmitter release in the NAc of both sexes, but OTR activation prolonged glutamate and GABA release in the NAc in males. These sex-specific mechanisms by which NAc OT facilitates social play may have relevance for OT treatment in ASD and schizophrenia.

COMPARISON AND TESTING OF ANATOMICAL VALIDITY BETWEEN MANUAL AND AUTOMATIC APPROACHES

Timothy Chalom

Neuroscience, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 222
Mentor(s): Andrew Bender (EPIDEMIOLOGY AND BIOSTATISTICS)

Measurement of regional brain volumes on structural magnetic resonance imaging (MRI) data can be performed using manual and automated approaches. However, these methods differ in both validity and cost: Manual segmentation is considered the gold standard due to its anatomical validity, but it is laborious and time-consuming. In contrast, automated computerized volumetric methods are considerably faster but lack the anatomical precision of manual approaches. The past 15 years have seen a shift away from manual and towards automatic segmentation of MRI data, due to researchers' desire to forgo the long process involved in manual volumetry, but this may come at the expense of valid measurement. The present study reports our ongoing attempts to bridge the divide between manual and automatic segmentation methods. Our goal is to develop a method that combines intensity-based segmentation with manual volumetry rules to provide accurate and reliable regional brain measures. Here, we report the results of our attempts to develop and apply these procedures to delineate two regions of interest (ROIs): the caudate nucleus and the insular cortex. Using software tools and algorithms in the FSL software suite, we isolated the individual regions, apply intensity-based segmentation, and then manually edit the resulting masks in accord with established procedures for manual volumetry. We report comparisons of these methods against fully manual and automated methods performed in the same, lifespan developmental data set.

HOW DOES THE BRAIN'S FEEDING CENTER CHANGE IN RESPONSE TO OBESITY?

Allie Pataro

Neuroscience, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 223
Mentor(s): Alexander Johnson (PSYCHOLOGY), Lauren Raycraft (PSYCHOLOGY)

Obesity is an emerging problem in numerous countries, both developed and underdeveloped, and has become a pressing global-health issue. Neuroscience techniques can be used to explore the issues surrounding obesity and how it affects specific areas of the brain. The lateral hypothalamus (LH) has traditionally been viewed as the brain's feeding center. In this study we examined the effects of dietary obesity on the LH and its capacity to respond to environmental cues associated with food. In the LH, two signals that stimulate food intake have been well characterized: Melanin Concentrating Hormone (MCH) and orexin (ORX). We examined whether mice that were fed either an obesity-promoting 45% high fat diet, or a control (10% fat) diet showed differences in the expression of these two feeding signals—as indicated by fluorescent labelling of MCH and ORX producing cells. Furthermore, by utilizing the commonly used marker for neuronal activity, c-fos, we examined whether there were obesity-evoked differences in the responsivity of MCH and ORX producing neurons to environmental signals paired with food. This study will provide evidence as to whether neuropeptide expression in the LH differs in obese versus healthy mice and, if so, whether obesity changes how the LH encodes food-related environmental signals.

THE EFFECT OF SHIFTWORK ON THE CIRCADIAN RHYTHMS IN REPRODUCTIVE TISSUES

Autumn McLane-Svoboda
Neuroscience, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 224
Mentor(s): Alexandra Yaw (ANIMAL SCIENCE), Hanne Hoffmann (ANIMAL SCIENCE)

There are many careers, including health and protective services, that are dependent on nightshifts, which disrupts the body's internal time-keeping system controlled by cellular circadian clocks. Shiftwork induced circadian desynchrony negatively impacts bodily functions, including reproduction, although underlying mechanisms are largely unknown. Our goal is to determine how shiftwork impacts circadian rhythms in the reproductive axis in mice. We hypothesize that shiftwork negatively impacts circadian rhythms in male and female reproductive tissues. We used validated circadian Per2::luciferase reporter mice which have a bioluminescent enzyme linked with the Per2 molecular clock gene. Per2::luciferase mouse circadian behavior was assessed using running wheels with a light-based shift work paradigm (Light12h:dark12h, time of lights on shifted 6 hours every 4 days for 5 weeks). Locomotor analysis were performed by analyzing the patterns in the timing of wheel-running activity during shiftwork. We found that male mice adapt to shiftwork with no changes in circadian locomotor period. Female behavioral data is being generated. To assess the effect of light-based shiftwork on tissue level circadian rhythms, we analyzed Per2::luciferase waveforms in the reproductive axis following shiftwork. Preliminary data from both sexes suggest that shiftwork alters several components of circadian Per2 oscillations, with the most drastic changes occurring in the amplitudes of the epididymis and uterus, indicating either a downregulation of clock function or cellular circadian rhythm desynchronization. Our next step is to understand how reproductive function is altered in these mice. Together, this work provides insight to how shift work influences circadian rhythms in reproductive tissues.

COCAINE DRIVES ABERRANT GENE EXPRESSION IN VENTRAL HIPPOCAMPUS

Megan Dykstra
Neuroscience, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 225
Mentor(s): Andrew Eagle (PHYSIOLOGY)

Drug addiction involves complex changes in brain physiology that are not yet fully understood. The hippocampus (HPC) is a brain area important for learning and memory and that may regulate some of the changes that underlie addiction. The HPC can be divided into dorsal and ventral regions, and dysfunction of dorsal HPC is associated with reduced cognition or dementia while dysfunction of the ventral HPC is associated with altered reward processing, such as increased drug seeking in addiction. Delta-FosB is a transcription factor that is induced by chronic stimuli, such as drugs, and we have found that it is important for HPC function. We and others have also shown that delta-FosB is induced in the dorsal HPC by cocaine and regulates cocaine-mediated gene transcription. The goal of this project was to uncover whether cocaine also drives gene expression in the ventral HPC in a mouse model of chronic cocaine self-administration. We found that delta-FosB is induced in the ventral HPC following chronic cocaine self-administration and that cocaine regulates gene expression in the ventral HPC, potentially via delta-FosB transcriptional activity. These findings suggest that delta-FosB is induced by cocaine in the ventral HPC and regulates a pattern of gene expression that may underlie cocaine seeking behavior.

INVESTIGATING A NOVEL MODEL OF INHERITED MOTOR NEURON DISEASES

Kate Reidy
Neuroscience, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 413
Mentor(s): Niamh O'Sullivan (EXTERNAL MENTOR)

Hereditary spastic paraplegia (HSP) is a neurodegenerative group of diseases affecting the distal regions of the longest motor neurons in the corticospinal tract. It is mainly caused by mutations in proteins shaping the smooth endoplasmic reticulum. The endoplasmic reticulum (ER) is a network of sheets and tubules, composed of the rough ER (RER) and tubular smooth ER (SER). Much about the functions of the SER is still unknown today. However, mutations in these ER-shaping proteins (spastin, atlastin, REEP 1, and reticulon 2) cause disruption of the morphology of the ER. Pathways, still poorly understood, causes symptoms of lower limb weakness and spasticity, seen in HSP. In order to investigate the role of the ER-shaping protein reticulon 2, a novel model of HSP, caused by the knockout of the Drosophila melanogaster, common fruit fly, orthologue of reticulon 2 (RTN2), reticulon-like 1 (Rtnl1), was studied. A larval locomotor crawling assay was completed to see the behavioral response to the mutation and to identify any locomotor defects. Image analysis of the neuromuscular junctions (NMJs) of dissected larvae were used to identify any neurodevelopmental issues of the axons. It is important to study the molecular events underlying the disease, in order to investigate causes along with novel models that recapitulate the disease well.

EFFECTS OF BEDTIME ON THE RODENT BRAIN

Libby Hill, Rachel Zhang
Neuroscience, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 414
Mentor(s): Barbara Lundrigan (INTEGRATIVE BIOLOGY), Laura Smale (PSYCHOLOGY)

Nocturnal and diurnal animals have different times of the day at which they are most active. During the day, sunlight provides a source of information about the world that is not available at night. Getting the photic information requires visual structures in the brain, and the more visual brain an animal has, the more visual information it can process. The pulvinar is a part of the forebrain that is engaged in visual processing. Specifically, it is part of a visual pathway that operates in parallel with the primary one. Since nocturnal animals operate in the dark and diurnal animals are active when there is sunlight, their use of visual cues likely differs. This suggests that the size of the pulvinar region of diurnal rodents will be larger than that of

nocturnal rodents. Our research builds upon the works of Andrea Morrow, who sectioned and stained brains of many rodents and uploaded images of those slides into Stereo Investigator, a computer software image analysis program. Our method was to use these images and Stereo Investigator to measure the pulvinar region of nocturnal and diurnal rodents. The brain weight of each rodent was also considered before the measurements of the pulvinar region were compared. Our data suggest a difference between nocturnal and diurnal rodents.

CHARACTERIZING THE ROLE OF VTA SGK1 IN DOWNSTREAM COCAINE-INDUCED NEURONAL ACTIVATION

Ali Stark
Neuroscience, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 415
Mentor(s): Michelle Mazei-Robison (PHYSIOLOGY)

Drug abuse results in part from neuroadaptations in the ventral tegmental area (VTA), part of the mesocorticolimbic reward circuit. Our lab studies the role of serum- and glucocorticoid-regulated kinase 1 (SGK1) in the VTA in regulating drug reward. We previously found that chronic morphine and cocaine administration increases VTA SGK1 catalytic activity, and VTA viral-mediated overexpression of a catalytically inactive version of SGK1 (K127Q) significantly reduces cocaine reward behavior in conditioned place preference paradigms. We are now interested in assessing the downstream effects of VTA SGK1 manipulation, as VTA dopaminergic signaling to the nucleus accumbens (NAc) is a significant contributor to drug reward. In this project, I will test whether mice with VTA dopamine-specific overexpression of a catalytically inactive version of SGK1 (K127Q) show a difference in NAc neuronal activation following cocaine administration compared to saline-treated and control mice. I will perform immunohistochemistry to quantify the number of NAc neurons positive for c-Fos, a measure of neuronal activation. I predict that cocaine-treated K127Q-overexpression mice will display more neuronal activation in the NAc than their saline-treated counterparts but will not exhibit as much neuronal activation as cocaine-treated control mice. This finding would support our previous behavioral findings showing that overexpression of the K127Q mutant in VTA dopamine neurons reduces cocaine reward behavior in mice. Future studies would include assessment of NAc neuronal activation following morphine treatment in order to determine if VTA SGK1 regulation similarly alters opioid action. This work will allow us to better understand SGK1 regulation in drug abuse.

DEVELOPMENT OF AN AUTOMATED METHOD FOR STATISTICAL ADJUSTMENT OF MRI VOLUMETRIC DATA

Kaylen Doyle
Neuroscience, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 416
Mentor(s): Andrew Bender (EPIDEMIOLOGY AND BIOSTATISTICS)

Structural magnetic resonance imaging (MRI) is a valuable tool for detecting neuroanatomical changes, including regional brain atrophy associated with aging and neurodegenerative diseases such as Alzheimer's disease. Because brain volume is influenced by physical size, regional volumetric estimation needs to be adjusted to account for variation across the population. Currently, researchers perform volumetric adjustment using a variety of common approaches, but there is no standardized implementation of these methods. In order to encourage best practices for volumetric adjustment of structural MRI data, we developed a Python code base that provides 1) multiple established methods of volumetric adjustment, 2) functions to make outlier detection easier, and 3) categorical differences among groups. The three methods for volumetric adjustment include the residual/ANCOVA method, proportion

method, and power-proportion method. We implemented additional functions to detect outliers, points with high leverage, and points with high influence on the estimated weights of adjustment. This information can then be used to find and remove potential outliers, in accord with current standards for scientific rigor. We tested this code on volumetric data from the Aging Brain Lab at Wayne State University and the Alzheimer's Disease Neuroimaging Initiative. This code is easy to use and understand, standardizes the procedure, and eliminates the effort involved with manually adjusting regions of the brain for head size. This project represents the first software developed for volumetric adjustment of structural MRI data.

COMPARING HUMAN BRAIN MOTOR AND COGNITIVE NEURAL NETWORKS USING THE FMRI TECHNIQUE

Deaziah Ford, Meghan Ringle, Nicole Jiang-Kong
Neuroscience, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 417
Mentor(s): Jie Huang (RADIOLOGY)

Brain neural network activity controls human behaviors. Motor-associated neural networks control motor tasks such as rubbing fingers and cognitive-associated neural networks controls cognitive tasks such as reading sentences. The non-invasive neural imaging tool of Blood Oxygenation Level Dependent (BOLD)-fMRI can be used to investigate the relationship between specific human behavior and brain network activity. The goal of this research is to compare the neural networks between rubbing fingers, a simple motor task, and reading sentences, a simple cognitive task. Six subjects were scanned to acquire their brain functional images during task performances. They were instructed to either rub their thumb and forefinger together or read various sentences overtly in timed intervals of rest and task periods. The acquired functional images have been analyzed to identify functional networks activated by these two different tasks. For each subject and each task, a task-associated FAUPA (functional areas of unitary pooled activity) was identified in its corresponding representative sensorimotor area based on the task-induced signal time course changes, and then this signal time course was used as a reference to identify the functional network. The group-mean functional network and brain activity for these tasks were found to be uniquely different and were directly linked with the task performance, showing the association of brain functional network activity with human behaviors.

MOLECULAR CONTROL OF NEURONAL DIFFERENTIATION AND SPECIFICATION IN THE ENTERIC NERVOUS SYSTEM

Sara Cook
Neuroscience, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 418
Mentor(s): Julia Ganz (INTEGRATIVE BIOLOGY)

The enteric nervous system (ENS) is the portion of the peripheral nervous system, which innervates the gut to control functions, such as motility. Zebrafish are ideal models for studying the ENS, as larvae are transparent and the ENS is easily accessible. Little is known about what genes control ENS neuronal development. A set of transcription factors were suggested to be involved in neuron and neuronal subtype differentiation, two of them being dlx1a and jarid2. I aim to determine impact of loss of function of dlx1a and jarid2 on zebrafish ENS development. Preliminary data demonstrates that the functional loss of dlx1a and jarid2 using CRISPER/-Cas-9 genome editing results in reduced neuron numbers and changes in neuronal subtypes. To further study the role of dlx1a and jarid2 in ENS neuronal development, I am establishing stable mutant lines. This entails genotyping F1 zebrafish to identify heterozygous carriers of mutant alleles. Fish with the same mutant alleles will then be

incrossed to produce mutant and wildtype offspring. I will stain these larvae with antibodies against the pan neuronal marker Elavl and neuronal subtype markers nNOS and 5-HT. Then, I will dissect, image, and quantify neurons and neuronal subtypes in larval guts to determine if ENS neurogenesis is affected in mutant larvae compared to wildtype siblings. These results will allow us to understand the effect of loss of function of dlx1a and jarid2 on ENS neuronal development. This knowledge can be applied to understanding human ENS diseases that affect the gastrointestinal system including Hirschsprung's disease.

TOO STRESSED OUT TO EAT?: DO VENTRAL TEGMENTAL AREA NTSR1 NEURONS THAT RESTRAIN FEEDING INCREASE STRESS BEHAVIOR?

Jillian Matasovsky
Neuroscience, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 419
Mentor(s): Gina Leinninger (PHYSIOLOGY)

Dopamine (DA) neurons within the ventral tegmental area (VTA) modulate food consumption and locomotor activity, and therefore could be useful targets to support weight loss as needed to address the increasing rates of obesity. We found that a specific subset of DA neurons express neurotensin receptor-1 (NtsR1), and activation of these "VTA NtsR1 neurons" in mice suppresses feeding and promotes locomotor activity: dual behaviors that lead to weight loss. However, stress can also increase locomotion and decrease feeding in mouse models. Thus, the goal of this project was to determine if activation of VTA NtsR1 neurons increase stress behavior, which might aversively produce the weight-reducing effects. To examine this, we used excitatory Designer Receptors Exclusively Activated by Designer Drugs (DREADDs) to selectively activate VTA NtsR1 neurons in mice and then assessed them via three separate tests for stress behavior: nestlet-shredding, marble-burying, and the elevated plus maze test. Activation of VTA NtsR1 neurons did not increase stress behaviors (nestlet shredding, percentage of marbles buried, or percentage of time spent in the closed vs. open arms of the elevated plus maze) above control levels. These results indicate that activation of VTA NtsR1 neurons can support locomotor activity and decreased feeding behaviors that are effective for weight loss in mice without invoking aversive stress responses. Thus, in the future, designing drugs to activate VTA NtsR1 neurons might have promise to safely promote weight loss as needed to reverse the obesity epidemic.

GET WHISKED AWAY BY THE SENSORIMOTOR THALAMUS

Brooke Carrigan, Genin Howard
Neuroscience, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 607
Mentor(s): Barbara Lundrigan (INTEGRATIVE BIOLOGY), Laura Smale (PSYCHOLOGY)

In the animal kingdom, nocturnal species, whose activity is concentrated during nighttime, are very different from diurnal ones, which are most active during the day. These groups live in different sensory worlds as more light is available to guide the behavior of diurnal species. Our hypothesis is that nocturnal species rely less on visual systems and more on somatosensory processes than diurnal species and have larger regions of the forebrain dedicated to processing information from the body, e.g. whiskers, compared to their diurnal counterparts. We tested that by measuring regions of the thalamus, ventral posterolateral nucleus (VPL) and ventral posteromedial nucleus (VPM), that is dedicated to sensorimotor processing, in species with different activity patterns. The volumes of these regions were measured using the Stereo Investigator image analysis system. The volumes were divided by brain mass to correct for overall brain size. Data we obtained suggests that nocturnal rodents may indeed have larger VPM and VPL than diurnal ones. In the nocturnal species Acomys

cahirinus (common spiny mouse), the ratio was 2100612339 um3/g while in the diurnal species Avicanthus niloticus (African grass rat), that ratio was 1449629310 um3/g. The diurnal animal thus had a sensorimotor region, relative to brain size, that was 69% that of the nocturnal animal. These preliminary data are consistent with our hypothesis, they suggest that the somatosensory thalamus was much larger in the nocturnal than the diurnal species. This would enable the animals functioning in darker, less visual sensory worlds, to obtain more information via sensorimotor systems.

DAILY RHYTHM OF OREXIN IMMUNOREACTIVITY IN A DIURNAL RODENT MODEL OF SEASONAL AFFECTIVE DISORDER

Anna Moody
Neuroscience, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 608
Mentor(s): Lili Yan (PSYCHOLOGY)

Seasonal affective disorder is a type of depression that displays a reoccurring seasonal pattern, having an onset near fall and winter. The hypothalamic orexin (hypocretin) system likely mediates the effects that light has on affective behaviors. Our previous work using diurnal Nile grass rats has shown that there are fewer hypothalamic orexin-immunoreactivity (ir) cells in animals housed in a 12:12 hr light:dark (LD) cycle involving dim daylight intensity (50 lux, dimLD), in comparison to animals housed in bright daylight (1000 lux, brLD) and also exhibited higher depression-like symptoms. In the present study, we examined day/night fluctuation in the number, soma size, and optical intensity of orexin-ir cells in the hypothalamus of both female and male grass rats housed in dimLD or brLD for four weeks at perfused at ZT2 or ZT14. Brains were processed to examine orexin-ir in the hypothalamus (n = 6-8/condition/sex/time point). The results revealed a significant day/night difference in peptide contents observed at ZT14 in both brLD and dimLD conditions. The higher orexin-ir at night is consistent with the high release of peptide during the day in diurnal species. The brLD groups had a higher amplitude of fluctuation than dimLD. This tell us that daylight intensity modulates the degree of orexin change in the hypothalamus across a day. Results also revealed that intracellular orexin was lower in female grass rats in dimLD conditions at ZT2 and ZT14, but the same was not seen in males. The results suggest that daytime light intensity modulates OXA rhythms in a sex-specific pattern.

THE POTENTIAL ROLE OF WHITE MATTER HYPERINTENSITY IN ALZHEIMER'S DISEASE DEVELOPMENT AMONG HYPERTENSIVE ADULTS

Mari Dowling
Neuroscience, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 609
Mentor(s): David Zhu (RADIOLOGY)

Alzheimer's Disease (AD) is a neurodegenerative disease affecting the elderly population, characterized by signs of dementia. Though its symptoms and etiology have been studied extensively, treatment and prevention strategies are unclear. Recent studies proposed potentially reducing the risk of developing AD by controlling hypertension through exercise, medication, and diet. Our study assessed the role of hypertension-related brain lesions in AD development. These brain lesions are often detected as white matter hyperintensity (WMH) regions on T2 fluid-attenuated inversion recovery (FLAIR) magnetic resonance images (MRI). By utilizing MRI datasets provided by the Alzheimer's Disease Neuroimaging Initiative, the sizes and rates at which WMH lesions developed in the brain over a period of at least two years were estimated. A total of 527 subjects were included in our study across six different cognition conditions: Alzheimer's Disease, Mild Cognitive Impairment, Normal Cognition

baseline diagnoses that remain the same (respectively D-D, M-M, N-N) as well as those which change in condition (M-D, N-M, N-D). In addition, these conditions were split into hypertensive (H) and non-hypertensive (N) conditions. WMH volume of each subject was estimated using the Lesion Segmentation Tool (LST) implemented in the Statistical Parametric Mapping Version 12 (SPM12) software. It was shown that the difference in WMH volume increase rate between hypertensive and non-hypertensive conditions were insignificant, but the overall average volume is consistently greater in all hypertensive conditions ($p<0.05$). These results open the path for further investigation looking at location and shapes of WMH regions in relation to Alzheimer's development.

ELUCIDATION OF A LATERAL HYPOTHALAMIC CIRCUIT THAT PROMOTES DRINKING

Nandan Kodur

Neuroscience, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 610
Mentor(s): Gina Leinninger (PHYSIOLOGY)

Water intake is necessary for survival, but insufficient or excessive intake (due to dehydration or psychogenic polydipsia) endangers health. Defining the neural circuitry that modulates drinking is necessary in order to understand fundamental physiology, and to develop treatments to rectify derangements in drinking behavior. The lateral hypothalamic area (LHA) is essential for both feeding and drinking behavior, yet most research has focused solely on how populations of LHA neurons govern feeding. On the other hand, comparatively scant attention has been paid to how LHA neurons mediate drinking, but we have previously found that activation of the entire population of LHA neurotensin-expressing (LHANts) neurons in mice spurs drinking and suppresses feeding. Intriguingly, LHANts neurons send projections to many brain regions, including the lateral preoptic area (LPO), a region of the brain implicated in modulating drinking. Based on this, we hypothesized that the LHANts à LPO circuit mediates the accentuated drinking observed following activation of all LHANts neurons. To test this, we used a site-specific chemogenetic technique to selectively activate only the LHANts à LPO circuit, but not LHANts neurons projecting to other brain regions. We found that activation of the LHANts à LPO circuit is sufficient—but not necessary—to promote drinking. Thus, this circuit is likely responsible for the increased drinking observed following activation of all LHANts neurons. This finding provides a mechanistic understanding of how LHANts neurons orchestrate drinking and could, in the future, suggest how to target pharmaceutical agents to rectify deranged drinking.

THE ROLE OF MICROGLIAL PRIMING IN DEVELOPMENT OF CHRONIC, ENHANCED PAIN RESPONSES

Abi Otwell

Neuroscience, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 611
Mentor(s): Geoffroy Laumet (PHYSIOLOGY)

Microglia are spinal cord immune cells responsible for releasing inflammatory signaling molecules that send a "pain message" to the brain. They are unique in their capacity to undergo long-lasting epigenetic reprogramming that can either suppress or enhance future responses to nervous system injuries. Since chronic pain develops due to enhanced inflammatory responses from hyper-reactive microglia, I investigate and quantify the balance of pro-inflammatory (IL-1β) and anti-inflammatory (IL-10) interleukins. I hypothesized that there will be higher levels of IL-1β and lower or equal levels of IL-10 in primed microglia compared to controls. Increased IL-1β levels indicate a more robust pro-inflammatory response consistent with microglial hyper-reactivity and increased pain. Lower or equal IL-10

levels indicate a weaker anti-inflammatory response also consistent with this model. In this case, I anticipated greater p38 presence as well due to the increased microglial activity. On the other hand, high IL-10 levels better support the opposing model of microglial desensitization, weaker overall inflammatory responses, and decreased pain. My preliminary results provide some evidence of an exacerbated pro-inflammatory response and increased pain in primed experimental groups but repeated analyses of IL-1β and IL-10 levels are needed to corroborate these results. I will expand on my findings by considering IL-1β and IL-10 as biomarkers for pain magnitude and susceptibility to chronic pain to see if changes in a patient's interleukin levels could be used to signal the predictable onset of increased pain responses following a nervous system injury.

COMPARISON AND TESTING OF ANATOMICAL VALIDITY BETWEEN MANUAL AND AUTOMATIC APPROACHES

Dhaval Gandhi, Timothy Chalom
Neuroscience, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 612
Mentor(s): Andrew Bender (EPIDEMIOLOGY AND BIOSTATISTICS)

Measurement of regional brain volumes on structural magnetic resonance imaging (MRI) data can be performed using manual and automated approaches. However, these methods differ in both validity and cost: Manual segmentation is considered the gold standard due to its anatomical validity, but it is laborious and time-consuming. In contrast, automated computerized volumetric methods are considerably faster but lack the anatomical precision of manual approaches. The past 15 years have seen a shift away from manual and towards automatic segmentation of MRI data, due to researchers' desire to forgo the long process involved in manual volumetry, but this may come at the expense of valid measurement. The present study reports our ongoing attempts to bridge the divide between manual and automatic segmentation methods. Our goal is to develop a method that combines intensity-based segmentation with manual volumetry rules to provide accurate and reliable regional brain measures. Here, we report the results of our attempts to develop and apply these procedures to delineate two regions of interest (ROIs): the caudate nucleus and the insular cortex. Using software tools and algorithms in the FSL software suite, we isolated the individual regions, apply intensity-based segmentation, and then manually edit the resulting masks in accord with established procedures for manual volumetry. We report comparisons of these methods against fully manual and automated methods performed in the same, lifespan developmental data set.

NEUROLAW: WORDS OF WARNING

Dhaval Gandhi
Neuroscience, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 613
Mentor(s): Robyn Bluhm (PHILOSOPHY)

Neurolaw, the combination of neuroscience and legal studies, is an emerging and problematic field. Historically, phrenology, an early tool to observe the brain's ability by examining the natural surface of an individual's head, was prevalent in the legal setting in the mid-1800s. Fortunately, American judges were quick to dismiss phrenological evidence as it lacked scientific evidence. In the last century, neuroscience has been slowing reintegrating back into the American legal system with polygraphs and MRI technology. Polygraphs were used as a measure of an individual or a witness was being fully honest. Moderately, the scientific basis of polygraphs has been questioned. After thorough investigations from neuroscientists, there is a general consensus that polygraphs are inherently unable to accurately and reliably

distinguish between lies and the truth. Now, Functional Magnetic Resonance Imaging (fMRI) technology is being used for lie detection. This is unsettling as the machines used are unreliable, the results can be misleading, and the current legal system has inconsistencies that can make the matter more complicated. For these reasons, it's crucial that society separates the two fields of neuroscience and American law once again, as we did with phrenology until there is more scientific grounding for neuroscience-based legal evidence.

IL-6 TRANS-SIGNALING TRIGGERS ANGIOGENESIS IN HUMAN RETINAL ENDOTHELIAL CELLS

Zal Chinoy
Neuroscience, Oral Presentation
Section: 6, 3:30 PM
Presentation Number: 880
Mentor(s): Brett Trombley (BIOLOGICAL SCIENCE PROGRAM), Susanne Mohr (PHYSIOLOGY)

Diabetic retinopathy is clinically identified by macular edema and/or neovascularization. Full understanding of the mechanisms underlying these events is still illusive. Recently, IL-6 trans-signaling has been associated with angiogenesis in diseases such as cancer. Its role in diabetic retinopathy is unclear. Therefore, this studied aimed at determining the effect of IL-6 trans-signaling on induction of inflammation and angiogenesis on human retinal endothelial cell. Primary human retinal endothelial cells (HRECs) were treated with normal (7.8 mmol/L) or high (25 mmol/L) glucose in the presence or absence of IL-6 (5 ng/mL) or IL-6/sIL-6R (10-50 ng/mL) for up to 120 hours. Expression of receptors related to IL-6 signaling were determined using immunohistochemistry and flow cytometry. The release of inflammatory cytokines and growth factors was measured using multiplex magnetic bead assays. Angiogenesis was assessed through tube formation assays. Results demonstrate that HRECs do not express mIL-6R (membrane bound IL-6 receptor) but the co-receptor gp130. IL-6/sIL-6R treatment of HRECs promoted strong formation of very mature and long tubes (2802 ±1659mm) compared to untreated cells (600±859mm) ($p<0.016$). The number of tubes formed was significantly increased following treatment with IL-6/sIL-6R (2.6±1.5 versus 0.5 ± 0.75; $p<0.044$). Interestingly, effects of IL-6 trans-signaling were independent of glucose concentrations. Our study indicates that targeted therapies towards IL-6 trans-signaling may be efficacious for the treatment diabetic retinopathy.

HOW GLASS CATFISH ARE REVOLUTIONIZING NON-INVASIVE NEUROMODULATION TECHNOLOGY

Ryan Hunt
Neuroscience, Oral Presentation
Section: 6, 3:45 PM
Presentation Number: 881
Mentor(s): Galit Pelled (BIOMEDICAL ENGINEERING)

Kryptopterus bicirrihis has been shown to express the electromagnetic perceptive gene (EPG) which leads to increases in intracellular calcium levels and cellular excitability when activated by electromagnetic stimulation. In a variety of mammalian models, EPG has exhibited extraordinary potential as a non-invasive neuromodulation technology. In order to further optimize this technology, we must advance our understanding of the natural mechanism and function of EPG. It is critical to understand the mechanism by which EPG functions and to recognize if there are additional genes associated with this magnetic response. This study was designed to quantify the behavioral responses of K. bicirrhis to magnetic fields. Twelve K. bicirrhis were placed in a radial y-maze and exposed to a neodymium rare Earth magnet which produced a static magnetic field of 450 mT or a sham stimulus. Three stimulus locations were used (end of each arm) and tested four times for each

condition, for a total of twenty-four trials. To start each trial, fish were barricaded in the center of the y-maze. The stimulus location was sequentially rotated clockwise, alternating sham and magnetic stimulus. Additionally, a state-of-the-art animal tracking software was used to analyze changes in swim pattern when exposed to magnetic stimulus. Video tracking was done at 60 Hz resolution and analyzed using a radial y-maze tracking software written in Matlab and the deep learning software DeepLabCut. Our results show that fish spend significantly less time in the arm with the magnet compared to when that arm contains the sham (unpaired t-test $p<.05$).

AN INVESTIGATION OF BRAIN MORPHOLOGY IN PARASITIZED THREESPINE STICKLEBACK FISH

Mckain Williams
Neuroscience, Oral Presentation
Section: 6, 4:00 PM
Presentation Number: 882
Mentor(s): Janette Boughman (INTEGRATIVE BIOLOGY), Murielle Aalund (INTEGRATIVE BIOLOGY)

Parasitic activity can greatly alter the behavior, physiological processes, and anatomy of their hosts. The tapeworm Schistocephalus solidus is a common parasite of threespine stickleback fish (Gasterosteus aculeatus). Sticklebacks infected with S. solidus tend to swim closer to the surface making them easy prey for birds, the final host in the parasite´s life cycle. However, the exact causes of this behavioral change are still unclear. This paper examines the possible neuro-anatomical changes underlying these changes in Icelandic threespine stickleback. Naturally parasitized and non-parasitized sticklebacks from two different populations were dissected to remove the brains, which were then photographed under a microscope, and measured to obtain volume measurements of regions of the fish's brain, particularly the forebrain, a region understood to be important in predator-avoidance behaviors. I discuss here results of analyses aiming at identifying any potential atrophy or other anatomical distortions in the brains of parasitized fish which may be the root of their fatal behavioral changes. This study will help to further identify any structural changes that can be caused by parasites, aiding in a more comprehensive understanding of the mechanism through which parasites alter host behavior.

INVESTIGATING BRAIN NEURAL NETWORK ACTIVITY ASSOCIATED WITH TONGUE MOVEMENT

Alisha Phan, Natalie Spence, Yezen Anabtawi
Neuroscience, Oral Presentation
Section: 6, 4:15 PM
Presentation Number: 883
Mentor(s): Jie Huang (RADIOLOGY)

The non-invasive blood oxygen level dependent (BOLD) fMRI technique can be used to determine which areas of the brain are active during different motor tasks. It is well recognized that the motor cortex of the left hemisphere of the brain controls the movement of the right side of the body, while the right hemisphere controls the movement of the left side of the body. However, it is unclear which areas of the brain control tongue movement. To investigate the tongue movement associated brain functional networks, six subjects were scanned while being instructed to rub their tongue on the inside of the left or right cheeks in two separate fMRI scans in order to acquire functional images. These images will be analyzed to identify motor-task associated functional networks that control these two different tongue movements.

NUTRITION & FOOD SCIENCE

UNDERSTANDING THE IMPACT OF INOCULATION METHODS ON THERMAL INACTIVATION RATES OF EDIBLE INSECT POWDER USING ENTEROCOCCUS FAECIUM

Christina Abel
Nutrition and Food Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 147
Mentor(s): Quincy Suehr (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Sanghyup Jeong (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Edible insect powder is growing in demand as a protein supplement. Despite the high risk of microbial contamination, thermal inactivation kinetics for pathogens in edible insect powders as low moisture foods remains poorly understood. The purpose of this study was to evaluate the effect of inoculation methodology on thermal inactivation kinetics of Enterococcus faecium in edible insect powder and roasted ground whole crickets. Commercial cricket powder and whole roasted crickets were separately inoculated with Enterococcus faecium. After inoculation, the whole crickets were milled into a powder of similar bulk density to the commercial cricket powder. Both powders were conditioned to 0.25 aw prior to isothermal treatment at 78.6°C. Aluminum test cells (n=12) were filled with the powders and submerged in a water bath at the set temperature, with duplicate test cells removed at six different time points (0, 10, 20, 30, 40, and 50 min). Thermal inactivation was halted by submerging the test cells in an ice-water bath post-treatment. The powders were aseptically diluted in serial and plated on modified trypticase soy agar to enumerate E. faecium survivors. D78.6°C values were 11.67±6.04 and 18.32±3.9 min, for E. faecium in the whole ground cricket powder and commercial powder, respectively. The inactivation rates were found to be not significantly different ($p>0.05$). Understanding the impact inoculation methodologies have on the thermal inactivation kinetics of pathogens in processed products will help establish appropriate industrial kill-step validations for the edible insect powder industry.

SALMONELLA LETHALITY IN FULLY-COOKED BACON AND EVALUATION OF A NON-PATHOGENIC SURROGATE ENTEROCOCCUS FAECIUM FOR VALIDATION PURPOSES

Narindra Randriamiarintsoa
Nutrition and Food Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 148
Mentor(s): Bradley Marks (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Ian Hildebrandt (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Michael James (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Nicole Hall (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Ready-to-eat (RTE) meats require sufficient Salmonella lethality to comply with USDA FSIS regulations. Unlike other RTE meats, bacon cooking is controlled based on final product yield. However, there is limited information supporting pathogen lethality in commercial fully-cooked bacon. This study evaluated whether commercial cooking practices provide sufficient Salmonella lethality for fully-cooked bacon. Commercially traditional and thick-cut bacon slices were inoculated with Enterococcus faecium NRRL B-2354 or an 8-serovar cocktail of Salmonella. Inoculated samples were cooked in triplicate in an impingement oven (humidity 70% v/v, 20% fan speed) at temperatures of 232°C (up to 6 min) or 177°C (up to 10 min) to a commercially-relevant yield (40%). Samples were immediately cooled, weighed for yield calculations, serially diluted, and plated on differential media to enumerate survivors (37°C, 48 h). Additional triplicate trials were run at 177°C for 30 and 60 s, yielding under-cooked bacon, to evaluate E. faecium as a potential Salmonella surrogate. All treatments achieving the target product yield achieved >6.5 log reductions of Salmonella. All under-cooked

products (average yield of 75%) also achieved >6.5 log reductions of Salmonella and E. faecium. Fully and partially-cooked bacon achieved average maximum surface temperatures of 121 ± 7.8 and 92 ± 1.0°C, respectively. No statistical relationship between Salmonella and Enterococcus could be estimated due to the large reductions observed. Results indicate that commercial cooking practices for fully-cooked bacon ensure the target 6.5 log reduction of Salmonella lethality. This evidence is important for processors to comply with USDA FSIS regulations.

WHEAT ALLERGY: DO WHEAT GENOTYPES DIFFER IN ALLERGENICITY?

Aqilah Othman
Nutrition and Food Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 149
Mentor(s): Haoran Gao (FOOD SCIENCE & HUMAN NUTRITION), Perry Ng (FOOD SCIENCE & HUMAN NUTRITION), Rick Jorgensen (FOOD SCIENCE & HUMAN NUTRITION), Venugopal Gangur (FOOD SCIENCE & HUMAN NUTRITION)

Wheat allergy is a major type of food allergy that is increasing in prevalence in multiple countries including the USA. They are immune mediated adverse reactions to wheat proteins. They are expressed clinically as allergic dermatitis, enteritis, conjunctivitis, rhinitis, and life-threatening systemic anaphylaxis and asthma. There are 4 different genotypes of wheat--AA, DD, AABB, and AABBDD. It is unknown at present whether these distinct genotypes differ in their allergenicity. In this project, we tested the hypothesis that different wheat genotypes will show different profiles of IgE binding allergenic proteins. Salt-soluble wheat proteins from 4 wheat genotypes were extracted using a published protocol. Protein contents were quantified using the Bio-Rad method. Protein quality and the patterns of allergenic protein bands were determined using SDS-PAGE analysis. Using published information on known molecular sizes, allergenic protein bands were tentatively identified. We found that SDS-PAGE analysis under reducing conditions showed a large number of protein bands that were common among the 4 genotypes. Nevertheless, few proteins bands were different confirming that wheat genotypes differ in their protein profiles. Furthermore, IgE antibody binding capacity of proteins, was tested using an optimized IgE Western blotting method. Preliminary analysis of 4 genotypes showed a distinct profile of IgE binding proteins in 4 wheat genotypes. Future studies are planned to evaluate whether these 4 genotypes differ in their ability to cause allergic reactions in a mouse model of wheat allergy.

EFFICACY OF HOME-SCALE THERMAL TREATMENTS FOR MICROBIAL CONTROL IN A VARIETY OF FLOURS

Kase Nelson
Nutrition and Food Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 150
Mentor(s): Bradley Marks (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Ian Hildebrandt (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

Pathogen contamination of flour has led to large recalls and an increase of associated risks with minimally processed products, such as raw cookie dough. Online consumer resources have offered home-scale solutions for reducing pathogens in such foods; however, there is little evidence of treatment efficacy. An online search of household flour heat treatments informed the experimental design. All-purpose, whole-wheat, and gluten-free flours were inoculated with Enterococcus faecium NRRL B-2354, a valid Salmonella surrogate for thermal treatment of flour, and conditioned to a water activity (aw) of ~0.45 for ≥ 2 days. Samples were spread into a uniform layer ~0.5 cm thick, heat-treated in a convection oven at 177°C for 10 min, transferred to sterile bags, cooled, serially diluted, and plated on differential media.

Endpoint temperature and aw also were measured. Online consumer flour heat treatment resources lacked scientific references for Salmonella inactivation in flour. E. faecium survival was impacted by flour type and cook time ($P < 0.05$). After 5 min of treatment, no lethality differences were observed between flour types (~2.1 log reductions), and average temperature and aw were > 95°C and < 0.10. After heating 10 min, E. faecium survived better ($P < 0.05$) in whole-wheat flour (~3.6 log reductions) than in gluten-free flour (> 6 log reductions). Public awareness of microbial hazards associated with flour is increasing; however, none of the home-scale solutions evaluated were scientifically supported. Additionally, the results of this study illustrate the highly variable efficacy of such solutions.

PHENOLIC ANTIOXIDANT VARIATION BETWEEN PASTURE-PRODUCED EGGS AND CONVENTIONAL PRODUCED EGGS

Srikar Kesamneni
Nutrition and Food Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 151
Mentor(s): Jenifer Fenton (FOOD SCIENCE & HUMAN NUTRITION)

Consumer interest in pasture-raised chickens and egg production has increased due to consumer environmental concerns. In addition, there are perceived health benefits prompted by reported higher nutritional content in pasture-raised chicken eggs. In general, animal products such as milk and eggs are recognized to have bioactive compounds, including antioxidants. However, the variation of antioxidant phenolic compounds in egg yolk comparing pasture vs conventionally produced eggs is poorly described. This study investigated the difference in phenolic and flavanol content of egg yolk from pasture vs conventionally produced eggs. Egg samples were collected from commercial and local producers and characteristics of each egg were quantified (weight, yolk color). Yolk phenolic compounds were extracted using 70% methanol and 70% acetone and fractionated using C-18 columns. Total phenolic compounds (TPC), refined phenolic acids, flavonoid, tannin, and anthocyanins were quantified as using previously described colorimetric assays and plate reader technology. Egg weight for the conventional egg was significantly higher than commercial pasture and local pasture egg production ($p<0.05$) though yolk weight was not significantly different. Both local and commercial pasture produced eggs had a significantly higher yolk color than conventionally produced eggs ($p<0.001$). Total phenols (phenolic acids, polyphenolic amides) and total flavonoids (flavonols, flavones) did not differ significantly between pasture and conventionally housed chickens ($p>0.05$). Tannins and anthocyanins were not detected in the eggs. These results indicate limited variation in phenolic antioxidants between free-range versus conventional eggs. Future research should examine the differences in specific phenolic acids rather than classes in pasture vs conventional.

COMPARISON OF ANTIOXIDANT CONTENT BETWEEN PASTURE-RAISED AND CONVENTIONALLY-RAISED CHICKEN EGGS

Esha Garg, Viji Jambunathan
Nutrition and Food Science, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 152
Mentor(s): Jenifer Fenton (FOOD SCIENCE & HUMAN NUTRITION)

Consumer interest in total antioxidant capacity of foods has increased due to their purported health benefits. Eggs, a common nutrient source for consumers, contain phenolic and antioxidant compounds. However, the diet of chickens significantly influences the nutrient content and density of eggs. This study investigated the differences in antioxidant content, comparing conventionally-raised commercial, pasture-raised

commercial, and pasture-raised local Michigan eggs. Egg samples were collected from the grocery store and local producers. Egg characteristics including yolk weight, yolk color, and albumin weight were assessed. Egg yolk alpha-tocopherol and retinol concentrations were quantified by a commercial laboratory. Total carotenoid concentration was measured using a previously described spectrophotometric assay on a 96 well plate. Pasture-raised commercial and pasture-raised local eggs had significantly higher alpha-tocopherol content compared to conventionally-raised commercial eggs ($p<0.01$). Pastured-raised commercial and pasture-raised local eggs also had a significantly higher total carotenoid content than conventionally-raised commercial eggs. Retinol did not significantly differ between pasture-raised commercial and pasture-raised local compared to conventionally-raised commercial eggs ($p>0.05$). These results indicate that pasture-raised commercial and local eggs contain higher antioxidant capacity than conventionally-raised commercial eggs.

RECOMMENDED POLICY CHANGES TO ENSURE IRON AND FOLATE SUPPLEMENT COMPLIANCE DURING PREGNANCY IN MALAWI

Hannah Koch
Nutrition and Food Science, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 501
Mentor(s): Won Song (FOOD SCIENCE & HUMAN NUTRITION)

Low birth weights, stunting, and infant mortality rates are disproportionately high in Malawi, compared to global averages. This is cause for concern, as low birth weight infants are twenty times more likely to die than healthy weight infants. Maternal micronutrient deficiencies during pregnancy have an undeniable influence on these statistics. Specifically, iron and folate deficiencies have been linked with these negative outcomes. Recognizing this issue, the Malawian government has created a new policy where all pregnant women have access to free iron and folate supplements. Previous research on this policy shows a positive correlation between improved birth weights and supplement compliance. Despite this link, a large proportion of women are not completing the recommended supplementation dosage. Some factors influencing the lack of compliance include; the roads, lack of education, and side effects of the pills. This is the critical assessment of current policy and the shortcomings of the policy. This assessment aims to offer amendments to the current policy, such as increasing nutritional education programs, in hopes to increase compliance rates and, therefore, lower low birth weight prevalence in Malawi. Additionally, there is a need to conduct a field study, which looks at the recommended educational program's ability to increase supplement compliance among pregnant women.

QUANTIFYING THE SURVIVAL OF SALMONELLA DURING THE LONG-TERM STORAGE OF MULTIPLE SUGAR PRODUCTS

Andrew Kearney
Nutrition and Food Science, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 502
Mentor(s): Bradley Marks (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Ian Hildebrandt (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

The role of sugar as a mainstay ingredient in minimally processed food products suggests a need to evaluate the potential for Salmonella survival in sugar. This study assessed the survival of Salmonella in multiple sugar products during long-term storage. Granulated, powdered, brown, and liquid sugar obtained from a commercial supplier were inoculated with a 5-strain Salmonella cocktail. Samples were stored at three temperatures (4, 25, 37°C) in sealed containers, and sampled at 12 times up to ~1,000 days. Triplicate samples for each condition were serially diluted, plated on differential media, and survivors enumerated after

incubation for 48 h at 37°C. Data were analyzed using ANOVA to determine the impact of sugar type and temperature on Salmonella survival. Survivors were quantifiable in some sugar products beyond 1,000 days. No significant differences were observed between granulated, powdered, and brown sugar reductions (~1.5 log reductions) at 4°C at ~400 days ($P>0.05$). Significantly less Salmonella survived at 400 days of storage at 25 and 37°C ($P<0.05$), with average reductions of 2.7 log reductions for granulated and powdered sugar and >5 log reductions for brown sugar. At ~1,000 days, survivors were countable in 8/12, 1/12, and 1/12 of all samples stored at 4, 25, and 37°C, respectively. Salmonella decline during long-term storage increased with storage temperature, but most samples maintained detectable levels of Salmonella after a year. These results suggest that sugar contaminated with Salmonella could pose a risk even after long-term storage.

EVALUATING A SALMONELLA LETHALITY PREDICTION TOOL FOR THE SURFACE OF COOKED MEAT AND POULTRY PRODUCTS

Ian Klug

Nutrition and Food Science, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 503
Mentor(s): Bradley Marks (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Ian Hildebrandt (BIOSYSTEMS AND AGRICULTURAL ENGINEERING), Michael James (BIOSYSTEMS AND AGRICULTURAL ENGINEERING)

USDA provides guidelines for cooking ready-to-eat products based on core temperature; however, under dry cooking conditions, it is possible to get lower Salmonella lethality on the product surface than at the core. Current approaches to addressing surface survivors are limited in number and scientific support. This study aimed to determine the effectiveness of a "Hydrated Surface Lethality" (HSL) approach in estimating the reduction of Salmonella on the surface of beef and poultry. Meat samples were inoculated with an 8-serovar Salmonella cocktail. A full-factorial experiment was conducted, cooking the samples to core temperatures of 70 and 74°C, respectively, varying oven humidity (0.7, 30, 70% v/v), temperature (218, 232°C), and fan speed (low, high). Samples were then immediately cooled, dissected, serially diluted, plated, and survivors enumerated. The HSL approach was evaluated by applying USDA Appendix A time-temperature tables to temperature profiles whenr the surface was below the dew point. Salmonella reductions were measured in 42 beef strips, 35 beef patties, and 36 chicken breasts. The HSL concept correctly classified lethality outcomes (i.e., classifying as greater or less than 6.5 (beef) or 7.0 (poultry) log) for 26/42 beef strips, 22/35 beef patties, and 20/36 chicken breasts. Most HSL failures (36/45) were "fail-safe"; however, 9/45 failures were "fail-dangerous". While the HSL concept is an important tool to help understand the risks associated with surface Salmonella survivors, the classification accuracy was 60% and had considerable fail-dangerous samples.

STERILIZATION OF PEANUTS DURING MULTIPLE DRY ROASTING CONDITIONS

Emma Rawsky

Nutrition and Food Science, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 504
Mentor(s): Kaitlyn Casulli (FOOD SCIENCE & HUMAN NUTRITION)

Groups of peanuts were inoculated with E. faecium bacteria and were then subjected to dry roasting at different temperatures (121, 149, and 177° C), and different air velocities (.65 and 1.25 m/s). Results were taken at various points during the dry roasting process to determine how effective each set of conditions was over time.

DIETARY FLAVONOIDS TARGETING TRIPLE NEGATIVE BREAST CANCER

Jessica Kim

Nutrition and Food Science, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 505
Mentor(s): Andrea Doseff (PHYSIOLOGY), Elahe Crockett-Torabi (MEDICINE), Meenakshi Sudhakaran (PHYSIOLOGY)

Breast cancer remains the leading cause of malignancy-related death in females and continues to increase in prevalence worldwide. The lack of therapies for triple-negative breast cancer (TNBC) continues to be a challenge, owing to its highly metastatic and aggressive nature. Dietary flavonoids, found in fruits and vegetables, are attracting great interest in the prevention and treatment of TNBC due to their anti-carcinogenic properties. The goal of our project was to evaluate the structure-activity relationship and the mechanism by which flavonoids affect TNBC tumor growth and metastasis. We investigated the effects of structurally related flavonoids on the migratory nature of human MDA-MB 231 TNBC cells by using a wound-healing migration assay. To model the effects of flavonoids in tumor heterogeneity in vivo, 3-dimensional culture organoids from TNBC derived xenograft tumors were established. Small interfering RNA (siRNA) transfection of apigenin target heterogeneous nuclear ribonucleoproteins A2 (hnRNPA2), an oncogene overexpressed in cancer cells that leads to abnormal mRNA splicing, were employed to investigate how hnRNPA2 effects alternative mRNA splicing activity. We observed that the flavonoids apigenin and kaempferol inhibited migration in a dose-response manner. Conversely, the presence of a glucoside and/or the lack of double bonds within the flavonoid structure as in the case of apigenin-7-glucoside and flavanones exhibited no significant anti-metastatic effects. Analysis of hnRNPA2 knockdown revealed key insights into the interaction of apigenin with hnRNPA2 to regulate migratory behaviors. These novel insights showcase dietary flavonoids as practical functional foods that can benefit clinical applications in TNBC cancer prevention and treatment.

TOTAL FAT QUANTIFICATION OF GRASS-FED VS CONVENTIONAL GRAIN-FED CATTLE

Taya Smith

Nutrition and Food Science, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 506
Mentor(s): Jenifer Fenton (FOOD SCIENCE & HUMAN NUTRITION)

Health-conscious consumers are becoming increasingly concerned with the amount of fat present in foods. The current trend towards "low fat" or "reduced fat" foods can be found in any grocery store across the country. Current methods of quantifying total fat content are labor-intensive and time-consuming. Microwave-assisted extraction (MAE) has been proposed as a more efficient method of determining total fat content. MAE not only reduces the time needed to determine total fat content, but also results in similar yields as the current reference method for total fat determination. The objective of this study was to develop MAE methodology to quantify the total lipid content in grass-fed vs conventional grain-fed Red Angus and Angus Akaushi beef from the Lake City Research Center. Samples were taken from between the 11th and 12th rib and transported to Michigan State University. 0.5±.05g of beef was placed into a vessel containing 10mL solution 1:1 hexane/acetone. Extraction parameters were programmed to run at a max power of 1200W, temperature ramped at 5°C/min to 80°C and held constant for 15 minutes followed by an automatic cooling period. Cooled samples were filtered into a flask and the filtrate was further concentrated using a rotary evaporator. The flasks were dried in a forced-air oven at 100°C for 10 minutes to eliminate residual water content. The total fat content

was determined by subtracting the original weight of the vessel from the weight of the vessel plus oil. Total fat differences were analyzed comparing diet and cattle genetic background.

PHYSICAL-CHEMICAL ANALYSIS AND CONSUMER ACCEPTABILITY OF A READY TO EAT BEAN AND SILVERFISH SAUCE

Fleur Mushumba
Nutrition and Food Science, Oral Presentation
Section: 3, 11:00 AM
Presentation Number: 815
Mentor(s): Lorraine Weatherspoon (FOOD SCIENCE & HUMAN NUTRITION)

Iron and folic acid (IFA) supplements are necessary in pregnancy because of dietary limitations. However, in Uganda adherence to tablet supplements is low with an associated increase in negative maternal and child outcomes. This project addresses the problem creatively with the development and analysis of a culturally acceptable food that is rich in IFA for pregnant women. Beans and silverfish flours were used to prepare a ready to eat sauce. The two types of flour were prepared using cooking and oven drying methods and formulated based on 5 different ratios of beans and silver fish as follows: BS1 (90:10), BS2 (80:20), BS3 (75:25), BS4 (70:30) and BS5 (60:40). The composite flours were analyzed for proximate and mineral composition according to validated procedures. Physicochemical and hedonic (taste) properties were also assessed. Sensory evaluation included 20 panelists using a 9-point hedonic scale. Analysis of variance determined significant differences. All the composite flours were low in moisture content (6%-7.8%) and high in protein, 37.06% (BS2) to 26.63% for BS3. The highest iron content (35.4 mg/100g) and least (30.3 mg/100g) were recorded for BS4 and BS3, respectively. All samples had the required amount of folic acid except BS4 and BS5. Samples were slightly acidic (pH 5.8) to slightly basic (pH 6). All samples were moderately liked except for BS5 and BS4 that were only slightly liked. This product provides pregnant women with a more appealing alternative or complement to IFA pills, to improve IFA status and outcomes. Ongoing project efforts will test this hypothesis in the target group.

IMPACT OF PROBIOTICS AND CAYENNE PEPPER ON LIPOCALIN-2

Katelyn Murphy
Nutrition and Food Science, Oral Presentation
Section: 3, 11:15 AM
Presentation Number: 816
Mentor(s): Sarah Comstock (FOOD SCIENCE & HUMAN NUTRITION)

In the colon, high levels of the protein Lipocalin-2 acts as a marker 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 this protein 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. Lipocalin-2 was extracted from feces using a buffer specific for the inflammatory protein. These extracts were used in an enzyme-linked immunosorbent assay (ELISA) specific for lipocalin-2. Of the 34 participants 17 (50%) had lower lipocalin-2 concentrations after consuming tomato juice with cayenne compared to consuming tomato juice with no cayenne. Of the 22 overweight or obese participants, 12 (55%) had lower calprotectin levels after consuming cayenne. This was not different from chance (p=0.13). A Friedman test demonstrated that these two paired distributions were not significantly different from one another (p=0.30). The average lipocalin-2 levels without treatment were 43ng/ml and on treatment were 42ng/ml. In

conclusion, a 1-2g dose of cayenne per day for 5 days did not significantly affect fecal lipocalin-2 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.

ABUNDANCE OF BIFIDOBACTERIUM, PARTICULARLY HUMAN MILK OLIGOSACCHARIDE GENES, IN 6 MONTH OLD INFANTS

Lynn Ferro
Nutrition and Food Science, Oral Presentation
Section: 3, 11:30 AM
Presentation Number: 817
Mentor(s): Kameron Sugino (FOOD SCIENCE & HUMAN NUTRITION), Sarah Comstock (FOOD SCIENCE & HUMAN NUTRITION)

Bifidobacterium are found in the GI tract. They reduce inflammation and improve intestinal function. A specific strain, Bifidobacterium Infantis (B. Infantis), digests and consumes human milk oligosaccharide (HMO) structures and grows better than other bacteria in the presence of human milk. Our objective was to determine which B. Infantis genes along with a few other Bifidobacterium genes are present in the gut microbiota of 6 month old infants, and to determine if the amount of dietary human milk affects the presence of those genes. Quantitative real-time PCR reaction conditions for 11 primer sets, eight of which were specific for the different HMO degrading genes of B. Infantis, have been optimized. Six-month-old infant DNA was tested for the presence of each gene. For HMO degrading genes, 12.5% of samples are positive for SIA-266F/676R, 12.5% are positive for GH-492F/1002R, 75% are positive for Inf2348, 75% are positive for HC Bin, 12.5% are positive for GH0750F/1258R, 50% are positive for HH-60F/534R, and 87.5% of samples were positive for Blon0915. Infant samples revealed a variety of expression patterns. Looking at human milk association, it is noticed that infants who are receiving 50% or more of their nutrients in human milk tend to show up positive for more of the B. Infantis specific genes than those not consuming any human milk at all. A larger set of infant samples will need to be analyzed to determine if the amount of human milk an infant consumes is positively correlated with the presence of HMO-degradation genes.

MODIFYING DIETARY FIBER INTAKE THROUGH CRACKER CONSUMPTION TO STIMULATE BUTYRATE PRODUCTION

Madeleine Russell
Nutrition and Food Science, Oral Presentation
Section: 3, 11:45 AM
Presentation Number: 818
Mentor(s): Sarah Comstock (FOOD SCIENCE & HUMAN NUTRITION)

Butyrate, a short-chain fatty acid produced by fermentation of dietary fibers by the gut microbiota, has been associated with optimal health outcomes. Whole grains, a staple of western diets, have high amounts of dietary fiber and have been associated with increased levels of butyrate-producing bacteria in the gut microbiome. We attempted to increase butyrate production by supplementing the diets of (n=28) adults with 100 grams of whole grain crackers for four weeks. Each participant consumed each treatment cracker for one week. Treatments included: white wheat crackers, brown wheat crackers, white wheat crackers, and red wheat crackers. Each participant was instructed to eat the full amount of crackers provided each day, and fecal samples were collected at the end of each week. Individuals also submitted a dietary recall for the previous week at each time point. We performed qPCR on gDNA from each sample (n=28) to detect Faecalibacterium prausnitzii (butyryl-CoA transferase; but), Eubacteria Roseburia (but), and Clostridium acetobutrylicum (Butyrate Kinase; buk), all of which are known butyrate synthesizers. The relative abundance of the butyrate-producing genes (but, buk) were similar regardless of cracker type. However,

there was significant evidence that each individual's relative amount of butyrate-synthesizing bacteria was unique, thus confirming previous literature. A larger sample size could potentially determine the ability of an individual's baseline microbiota to moderate an increase in butyrate production upon exposure to whole grains.

FATTY ACID COMPOSITION OF CONVENTIONAL COMPARED TO PASTURE-RAISED EGGS

Selin Sergin
Nutrition and Food Science, Oral Presentation
Section: 3, 12:00 PM
Presentation Number: 819
Mentor(s): Jenifer Fenton (FOOD SCIENCE & HUMAN NUTRITION)

Eggs are a nutrient dense food rich in protein, lipids, and a variety of micronutrients. Consumer interest in pasture-raised chicken and egg production has increased due to consumer environmental concerns and interest in more nutritional products. Differences in egg production systems can alter the content of eggs, including their fatty acid profiles. The objective of this study was to compare fatty acid profiles of conventionally-raised commercial, pasture-raised commercial, and pasture-raised local eggs. Egg yolk fatty acids were determined using microwave-assisted fat extraction, acid-base methylation, and gas chromatography mass spectrometry analysis. Total saturated, monounsaturated, and polyunsaturated fatty acids did not significantly differ between production systems. However, total omega-3 fatty acids were significantly higher in pasture-raised compared to conventionally raised eggs (2.79% vs 1.17%, $p<0.05$). Pasture-raised eggs had a significantly lower omega-6:omega-3 fatty acid ratio (8.52 vs 16.26, $p<0.05$). Branched chain and several conjugated linoleic (CLA) isomers not typically reported in egg yolks were identified. CLA isomers did not differ between groups; however, pasture-raised local eggs had significantly higher total branched chain fatty acids than both pasture-raised commercial and conventionally-raised commercial eggs (0.06 vs 0.003 and 0.00, $p<0.05$). These results indicate that important variation exists in fatty acids profiles of egg yolks from different production methods which may have implications for consumer health.

EFFECT OF MICHIGAN WHEAT CONSUMPTION ON THE MICROBIOTA

Gigi Kinney
Nutrition and Food Science, Oral Presentation
Section: 3, 12:15 PM
Presentation Number: 820
Mentor(s): Perry Ng (FOOD SCIENCE & HUMAN NUTRITION), Sarah Comstock (FOOD SCIENCE & HUMAN NUTRITION)

The bacteria that comprise the gut microbiota affect the metabolism and immune system of the host. A diet rich in whole grains has been associated with increased bacterial diversity and improved human health. The goal of this study was to determine the effect of different types of Michigan whole wheat on the gut microbiota. This four-week study was conducted by distributing crackers to participants weekly consisting of 100g of wheat crackers (about 500kcal) per day and collecting a fecal sample from the participants at the end of each week. During the first and third weeks of the study, participants ate refined white wheat crackers; during the second week, white whole wheat; and during the fourth week, red whole wheat. Of 33 enrollees, five (15%) dropped out prior to the first sample collection. DNA from fecal samples was extracted and a 16S rRNA gene library was created consisting of a sample from each time point (n=4) for each participant (n=28). The library was sequenced, and the results were analyzed for community diversity and relative abundance of specific bacteria. Bacterial alpha diversity was stable throughout the study. The overall fecal bacterial community composition did not shift in response to the cracker treatments. Participant body

weights also remained stable. An analysis by enterotype was not conducted due to low sample size within some enterotypes. Future studies should enroll more participants from each enterotype as well as increase the dose of wheat.

1-YEAR INFANT GUT MICROBIOME PLAYS A SECONDARY ROLE IN INFANT GROWTH: A MICHIGAN COHORT

Eliot Haddad
Nutrition and Food Science, Oral Presentation
Section: 3, 12:30 PM
Presentation Number: 821
Mentor(s): Sarah Comstock (FOOD SCIENCE & HUMAN NUTRITION)

The human gut microbiota consists of all the microorganisms that reside within the human gastrointestinal tract and has been shown to correlate with a range of conditions such as obesity, irritable bowel disease, and autism. Human milk exposure and maternal health are key influencers of the infant gut microbiome and are suggested to protect against autoimmune diseases and obesity. Obese children are more likely to experience long-term health complications and adolescent/adult obesity. Although the gut microbiome has been shown to be highly associated with obesity in adults, the relationship between infant growth at 1 year of age and their gut microbiome is less clear. By extracting DNA from infant fecal samples and then sequencing the 16S rRNA gene, it is possible to characterize the gut microbiome. Using a cross-sectional analysis of gut microbiomes from 1-year-old infants (n=33) and their BMI-for-age z-scores (BAZ), we show that the infant gut microbiome is unrelated to infant BAZ. Rather, maternal pre-pregnancy BMI is the strongest predictor of 1-year-old infant BAZ. Although analysis of the gut microbiome at a broader range of timepoints is required for the formulation of a decisive conclusion, the initial results suggest that infant growth at 1 year may be dependent on environmental, physiological, and genetic factors. Future investigations should examine the relationship between the gut microbiota at earlier stages of infant development and later growth. These longitudinal analyses could determine if there is a period of time where the gut microbiota is correlated to later infant growth.

PHYSICAL SCIENCES

7-STEP SYNTHESIS OF SYNTHETIC LIGNIN FOR BIOMIMETIC CATALYST SCREENING FOR BIOFUELS

Megan Freds
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 65
Mentor(s): Gracielou Klinger (BIOCHEMISTRY & MOLECULAR BIOLOGY), James Jackson (CHEMISTRY)

Lignocellulosic biomass has the potential to replace petroleum fuels and chemicals. This biomass is made of sugar and phenolic polymers that can be valorized into plastics, fuels, and other products. The phenolic polymer, lignin, is energy dense but is currently unutilized in industry today due to its complex nature. Biologically, bacterial enzymes can break down the complex lignin polymer into small fragments. The Hegg/Jackson lab has developed a biomimetic catalyst that chemically replicates the enzymatic mechanism. To further screen these catalysts, a synthetic polymer was made to mimick the functional groups found in lignin. We detail here a 7-step synthesis of this model lignin polymer. Furthermore, we aim to

test this synthetic polymer with the biomimetic catalysts to guide our technology in producing renewable fuels and chemicals.

CALIBRATING THE SINGLE ATOM MICROSCOPE WITH THE FLUORESCENCE OF INDIVIDUAL IONS

Joseph Noonan

Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 66
Mentor(s): Jaideep Singh (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

The slow neutron capture process (s-process) that occurs inside stars is the source of many familiar elements like phosphorous and copper that make up our bodies and our technology. However, the s-process occurs much more slowly than other nuclear processes that form heavy elements, like the rapid neutron capture process. The Single Atom Microscope (SAM) is designed to be sensitive enough to detect individual magnesium ions, the products of the slowest step in the s-process, using the light that they give off by fluorescence after being embedded in a krypton sheet. However, it needs to be calibrated with the amount of fluorescence produced by a single ion. To do this, the number of ions embedded in the sheet by an ion beam had to be determined. This was determined by measuring the current of the beam and integrating over time to find the total charge, which could be converted into the number of ions. The beam current was measured by a Faraday cup, but it couldn't be kept in the beam for the entire time, or it would block the beam, so an aperture was used to approximate the beam current by examining how aperture data was correlated with Faraday cup data. The uncertainty and a confidence interval for the number of ions deposited were also calculated. This data can be combined with the total fluorescence given off by the embedded ions to determine the number of photons per ion.

AN END-TO-END SIMULATION ANALYSIS PIPELINE FOR INTERPRETING SYNTHETIC OBSERVATIONS OF THE CIRCUMGALACTIC MEDIUM

Brendan Boyd

Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 67
Mentor(s): Brian OShea (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING), Devin Silvia (COMPUTATIONAL MATHEMATICS, SCIENCE AND ENGINEERING)

The hot, low density gas surrounding galaxies, called the circumgalactic medium (CGM), is vital to understanding the structure and evolution of galaxies. The diffuse nature of the CGM makes it difficult to observe by traditional methods, so much of our understanding comes from studying absorption features in the spectra of light from distant quasars that passes through intervening galaxies. As a result, careful study of simulated galaxies is a critical part of interpreting these limited observations. These physics-rich simulations are incredibly complex and provide far more data than absorption line studies. However, the analysis of these simulations still needs to be connected to observations to maximize our knowledge of the CGM. Using multiple open-source software packages, we developed an analysis pipeline that can be used to study these data rich simulations and compare our results directly to the most current observational surveys. These tools provide us a whole new avenue to explore our simulations and should provide further insight into the physical mechanisms that produce the observed CGM properties. One direct application of this tool is to test whether observers can distinguish between metals that have been ionized through collisional ionization versus photoionization, which will help us to understand the density and temperature structure of the CGM. The pipeline can also be used to explore how well observers can determine whether

the absorption features were produced in the CGM or the interstellar medium of the galactic disk. These findings will advance CGM research and uncover the intricate nature of galaxies.

RECONSTRUCTION OF SCATTERING EVENT PARTICLE TRACKS IN THE AT-TPC

Gavin Wilks

Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 68
Mentor(s): Saul Beceiro Novo (PHYSICS-ASTRONOMY), Wolfgang Mittig (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

In an Active Target Time Projection Chamber (AT-TPC) the gaseous medium of the detector acts as both the target and the detector. By applying an electric field through the detector, particles that pass through the medium produce ionization electron, which can be detected by the electronics found within the AT-TPC. The electronic signal found on a 2D plane at the end of the detector must then be reconstructed into a 3D projection to allow for particle track reconstruction. The focus of this work is developing algorithms and software that will allow for the reconstruction of the particle paths regarding linear and helical trajectories of particles. Both of these particle paths lose energy through the detector as a result of the electric field, which leads to nontrivial track reconstruction as the particle decelerates. Linear trajectories are approached with the RANSAC method, a random line finding method that contains user-tuned tolerances for finding tracks, which are then optimized using the Monte Carlo method. Helical tracks are a result of applying a magnetic field through the detector, which must be fit using the Monte Carlo method applied to equations of motion for damped helical spirals (spiraling inwards). The identification of the particle tracks in this detector allows for the reconstruction of the reaction vertex. The angle and energies associated with this vertex provides insight to the nuclear structure of indirectly detectable compound nuclei that exist for a short period of time at the interaction vertex.

SANDS OF MARS

Alex Dubinski, Brennan Sollenberger, Derek Abbott, Mike Collins

Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 69
Mentor(s): Michael Velbel (EARTH AND ENVIRONMENTAL SCIENCES)

The first Mars Global Simulant, or MGS-1, was designed to replicate sand from the Rocknest region on Mars. Scientists require a simulant to run tests on to learn as much as they can about the Martian surface before sample return is made possible. The primary goal is to examine the similarities between photographs of regolith taken at the Rocknest location on Mars by the Curiosity Rover and compare them to Scanning Electron Microscope (SEM) and Keyence Microscope photographs of the MGS-1 simulant. The two samples are compared on the basis of length/width, color, sphericity, transparency, and roundness (using the Powers scale). The SEM images of about 170 grains of the MGS-1 simulant were included in this study. They allowed us to measure the sizes (average of length and width) which were in the range of 200-300 micrometers. While the grains were most commonly brown and occasionally black in color, there were a handful of white, translucent particles. The simulant was skewed towards the rounded edge of the powers scale. Most grains were sub-rounded or sub-angular. The majority of the grains were opaque but some were translucent. In the coming weeks, images of Rocknest regolith will be measured and compared against the MGS-1 sample. While many of the characteristics are expected to be similar, with no sample return it is near impossible to perfectly replicate the Sands of Mars.

IMPACT OF ELECTRON CAPTURE ON SUPERNOVA

Sheldon Wasik
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 70
Mentor(s): Sean Couch (PHYSICS-ASTRONOMY)

Supernovae are large stars at the end of their life that undergo an explosion. The nuclear process that drive these explosions are complex but can be modeled by todays supercomputers. Of the two types of supernovae, a core collapse supernova occurs when a star collapses in on itself due to gravity, and then proceeds to explode outward due to pressure. An important factor that helps drive this explosion is electron capture. Electron capture is a process in which a proton rich nucleus of a neutral atom absorbs an inner electron. The result of this is a neutron and a neutrino, resulting in pressure changes inside of the star. In the past, supernova simulations have used approximated electron capture rates. However, in recent studies, it has been shown that the simulations are most sensitive to electron capture around neutron number 50 (around Kr86). Therefore, electron capture rates in and around this region were found in the lab. We are using these actual electron capture rates to produce a neutrino opacity table to put in place of the old one. With STIR (Supernova Turbulence in Reduced dimensionality), we can run a 1-Dimensional simulation of a core collapse supernova before, and after, the addition of the electron capture rates found in the lab. Since we are holding every other variable the same, this will allow us to directly show how electron capture around the neutron number of 50 region affects the explosion (or lack of) of a core collapse supernova.

REDESIGN OF AN ION CHAMBER FOR INCREASED RESOLUTION OF PB-196 ENERGY MEASUREMENTS

Aaron Jonckheere
Physical Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 71
Mentor(s): Man-Yee Tsang (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

In the beginning, the big bang created the lightest atoms in the universe: hydrogen, helium, and lithium. As the universe cooled, stars formed and heavier elements, up to iron, were synthesized through fusion. Heavier elements are created through the capture of neutrons on these intermediate mass elements. The heaviest elements are created through the rapid neutron-capture process (r-process). During the rapid capture of neutrons, atoms will beta decay and fission as they become more unstable. Beta decay converts a neutron into a proton and moves the atom up the Z line. Fission, on the other hand, splits the atom in two, creating new medium masses elements that can then undergo the r-process again. In order to study how fission affects this process, we need to understand the fission dynamics of isotopes away from stability. At the cyclotron lab, an experiment is planned to study the fission properties of lead-196. Pb-196, along with a large number of neighboring isotopes, are produced from a Pb-208 ion source. To identify it the isotopes, a gridded ion chamber will be used to measure the energy and speed of the beam particles with a time of flight detector. In my presentation, I will discuss my work on the constructing and tests of the new ion chamber.

FISSION OF LEAD-196

Bergen Kendziorski
Physical Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 227

Mentor(s): Adam Anthony (FACILITY FOR RARE ISOTOPE BEAMS), William Lynch (PHYSICS-ASTRONOMY)

Nuclear fission is a process by which a nucleus splits into two parts. This split can occur either symmetrically or asymmetrically. Since the discovery of fission, we have known of a region in the actinides that undergoes fission asymmetrically. Recent experiments have found an additional "island" of isotopes that undergo asymmetric fission, while the surrounding isotopes fission symmetrically. The isotope 196Pb is on the edge of this island, making it an isotope of interest. The purpose of this research is to study theoretical predictions for fission observables associated with this nucleus, including the cross-section (probability of happening) and the asymmetry of the daughter fragments. Specifically, we analyzed the relationship between dipole moment (elongation of the nucleus), quadrupole moment (mass asymmetry), and the potential energy of the nucleus. These calculations were performed using a code, HFBTHO, running on the HPCC. Many different configurations were explored, each differing by their elongation and mass asymmetry parameter. Preliminary results will be presented.

NUCLEAR INTERACTIONS, SIMILARITY RENORMALIZATION GROUP EVOLUTION, AND PICTURES!

Dannie Ward

Physical Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 228
Mentor(s): Heiko Hergert (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

Nuclear physics aims to answer fundamental questions about the origins of subatomic matter, like how and where it comes into being, and how it organizes itself. Researchers at the National Superconducting Cyclotron Laboratory (NSCL) and Facility for Rare Isotope Beams (FRIB) pursue these answers by colliding nuclei in experiments, or performing theoretical simulations. The interplay between the observation of nuclear properties like binding energies or radii and nuclear theory provides information on the fundamental two-, three- and higher many-nucleon interactions. Modern models of the nuclear interactions are based on Effective Field Theories (EFT) and Renormalization Group (RG) methods. Here, we apply the Similarity Renormalization Group (SRG) approach to matrices that encode diverse data ranging from images to nuclear interactions. The SRG implements a gradual unitary transformation of such matrices to a desired shape as a specific parameter evolves, all while preserving their eigenvalues, which encode their essential information. This is demonstrated by transforming a randomly generated matrix into the MSU logo, as well as using the SRG to determine the ground state of the deuteron.

MODELING QUADRUPOLE TRANSPORT OF CHARGED PARTICLE BEAMS WITH PYTHON

Emily Jevarjian

Physical Sciences, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 229
Mentor(s): Nick Valverde (PHYSICS-ASTRONOMY), Steven Lund (FACILITY FOR RARE ISOTOPE BEAMS)

Charged particle beams have a wide range of applications from discovery science in high energy and nuclear physics, to materials science, to industrial and medical applications. Quadrupole magnets are typically used to efficiently transport beams. Large codes, such as the "Elegant" are used to design quadrupole transport lattices. Such codes have many advanced features, but can be difficult to use. Here, we construct a simple Python code with matplotlib graphics to design quadrupole transport lattices. This code can be readily modified by students for use in educational studies or employed as a conceptual

design tool. Quadrupoles are modeled as "thin lens" equivalent kicks and beam transport is modeled by linear transfer matrices. For a specified charged particle beam and thin lens focusing lattice properties, needed laboratory quadrupole parameters are output. Phase-space visualization tools illustrate the evolution of the distribution of beam particles in the lattice. Matching considerations are analyzed to determine beam conditions needed to reduce edge excursions of the bundle of particles in the transport lattice for optimal transport with minimal prospect for losses on material apertures of the beam-pipe. Stability considerations and conservation of phase-space area are demonstrated. Results are compared to the Elegant code.

MACHINE LEARNING RECONSTRUCTION OF PARTON DISTRIBUTION FUNCTIONS

Carson Honkala
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 230
Mentor(s): Huey-Wen Lin (PHYSICS-ASTRONOMY), Rui Zhang (PHYSICS-ASTRONOMY)

Currently, the search for new physics is limited by the accuracy of parton distribution functions (PDFs), which shows the probability of finding the fraction of momentum carried by the constituents (called partons) of a proton. As of now, PDFs can only be estimated by combining decades of experimental proton-smashing data; however, many parts of the PDFs are only known imprecisely. Using a first-principle theoretical physics tool known as "lattice quantum chromodynamics", one can directly calculate PDFs by using supercomputers to compute the spatial properties of a PDF, followed by performing a Fourier Transform (with additional physical matching functions) on the data to obtain the PDF in momentum space. This calculation is by no means perfect and suffers from the notorious "inverse problem". We propose to solve this problem by using pseudo-data that has similar structure to the real PDFs. Using this "known" data, we can train a model with neural-network machine learning. The trained model can then be used to estimate the PDFs from real, numerical data and/or provide a better estimation of PDFs from the first principle method.

NSCL DDAS PROJECT

Cassidy Kersten
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 231
Mentor(s): Dean Lee (FACILITY FOR RARE ISOTOPE BEAMS)

The purpose of this research project was to study the properties of particles with very small half-lives. This group focused on beta-decay in particular. First, a code was set up through the Linux computer application in order to obtain emission spectra during the run of the actual experiment. A silicon double-sided strip detector (SiDSSD) with a source in front of it was put into place in order to study particle emissions. After ensuring that the detector was in a vacuum and there was no leakage or entry of air, the beam was turned on and the emission spectra were recorded through the computer application.

A COMPARISON OF CURIOSITY'S ROCKNEST SOIL SAMPLES TO MGS-1 SOIL ANALOG

Rajsri Raghunath, Trevor Dalrymple, Xinning Shan
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 232
Mentor(s): Michael Velbel (EARTH AND ENVIRONMENTAL SCIENCES)

Over the years, Mars missions have provided us with an abundance of information about sand grains that could tell us more about the composition of the planet. Our research targets the

soil samples analyzed by the Mars rover Curiosity at the Rocknest site. At present, there is no comprehensive way to organize and classify soil samples from Mars missions. We plan to develop a methodical approach for classifying sand grains based on a terrestrial soil analog (labeled MGS-1), which serves as a regolith simulant for this research. Using MGS-1, our goal is to gather data based on our classification parameters and compare the simulant samples to the sand grains analyzed by Curiosity at Rocknest. In the MGS-1 sample, the size of grains varies greatly, the maximum size ([W+L]/2) being roughly 600 micrometers. The average size of grains is about 200 - 300 micrometers. In addition to the dimensions of grains, this project also investigates the physical properties of sand grains using our classification system (such as color, roundness) to make the comparison more comprehensive.

GRAPHENE DETECTION WITHIN NATURALLY OCCURRING CARBON BASED SUBSTANCES

Carson Kipp
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 233
Mentor(s): Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Graphene was once theorized to be the super material of the future because of its strength, low density and other unique properties which arise from its two dimensional hexagonal lattice. However, Graphene has not been a viable material for large scale use, as scientists and manufacturers have been only able to create small flakes of the substance at a time. This project will analyze various forms of naturally occurring carbon based substances in an effort to identify a source of graphene which is both abundant and easily extractable. The structures of the carbon based substances were examined near the surface of each substance for Graphene's hexagonal lattice by Scanning Electron Microscopy (SEM). The substances were also analyzed using various SEM environments and methods to detect bands of graphene layers within each substance. The results of this project were evaluated with respect to known Graphene sources identified within published findings in order to determine if graphene is more abundant or obtainable that previously theorized.

FINDING SIMILARITIES BETWEEN MGS-1 AND ROCKNEST REGOLITH

Chloe MacNee, David Leen, Dejah Wakefield, Emma McLaren, Mikayla Widener
Physical Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 234
Mentor(s): Michael Velbel (EARTH AND ENVIRONMENTAL SCIENCES), Mikayla Widener (NATURAL SCIENCE)

Sample return from Mars is something that has eluded scientists in the past. As scientists have never been in direct contact with regolith, finding a way to transport it for possible grain acquisition in the future is crucial. With the use of the Mars analog MGS-1, we are looking for similarities between the analog and data taken specifically from Rocknest. The data collected from Rocknest, a specific location on Mars, summarized properties of regolith including size and roundness. We took SEM images of individual grains from the MGS-1 samples as well as optical microscope photos of the thirteen unique samples to note key characteristics of the grains. We classified the size, color, equantcy, angularity, and sphericity of each individual grain using classification criteria specified by UGS 200H students. With this information, the most efficient way to move regolith can be deduced and possible sample return may be achieved in the future. This may be pivotal as the acquisition of Mars regolith could provide a more in-depth look into the history of Mars, especially geologically. From the initial results, we have learned much about the size, color, and angularity of the grains from the MGS-1 analog. So far, we have found size averages ranging from 129 to 302 microns across four samples.

Next, we will perform the same analysis techniques on data from the Rocknest site on Mars. Once this is complete, we can compare the data to our MGS-1 analog to check for further similarities.

ANALYSIS OF KYANITE MINERAL MICROSTRUCTURE AND CHEMICAL COMPOSITION

Graham Bailey
Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 235
Mentor(s): Carl Boehlert (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

The study of minerals and their properties can prove useful for industrial applications, but only a limited amount of information can be gathered with the unaided eye. Through the implementation of more advanced techniques, information can be gathered about both the chemical composition as well as the microstructures of a sample. This can lead to insights about possible uses for a mineral. Utilizing advanced techniques in material analysis, an investigation of a kyanite mineral sample embedded in quartz was conducted. This included an examination of the microstructure of kyanite, quartz, and the junction between the two using Scanning Electron Microscopy (SEM). Additionally, the chemical composition of the sample was determined through Energy Dispersive Spectroscopy (EDS). The findings of this investigation will be presented, including pictures from the SEM of the sample microstructures, alongside the results of the elemental analysis.

PYROGENIC SILICA MODIFICATION OF VAPOR DEPOSITED GOLD ELECTRODES

Erik Kirakosyan
Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 236
Mentor(s): Denis Proshlyakov (CHEMISTRY), Nathan Frantz (CHEMISTRY)

The foundation of numerous biological processes in vivo hinge on reduction/oxidation chemistry, including the phosphorylation of Glucose-6-Phosphate, oxidative phosphorylation, and the biosynthesis of high energy NADH from NAD+. Using gold electrodes, such processes are the focal point of novel electrochemistry research. However, exposing biological agents directly to the electrode surface results in fouling—the formation of a layer that hinders the transfer of electrons between the analyte and the electrode surface. One remedy to this is to modify the electrode surface with a conductive, bioinert material. Additionally, thin, vapor-deposited gold electrodes are preferred for their flexibility in shape and size, however, developing a modification technique becomes complicated due to the electrode's fragility. Literature has previously demonstrated that pyrogenic silica modifications are effective on gold electrodes. Furthermore, it has been shown that the characterization of the hemeprotein cytochrome c (involved in electron transfer between complexes III and IV of the electron transport chain) is possible when using this modification. Through cyclic voltammetry, our preliminary results have demonstrated that pyrogenic silica prevents fouling while having a negligible impact on the electrochemically active surface area of the electrodes. However, further characterization of these vapor-deposited gold electrodes is necessary to maximize the electrode's longevity and effectiveness. We will examine optimal storage conditions, cleaning protocols, and re-modification techniques using pyrogenic silica. This will enable further characterization of biological processes in a variety of settings using modified vapor-deposited gold electrodes.

EFFECTS OF PREFERENTIAL WATER FLOW ON ACIDIFICATION AND WEATHERING IN SANDY SOILS, NORTHERN MICHIGAN (USA)

Matt Hadden

Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 237
Mentor(s): Randall Schaetzl (GEOGRAPHY, ENVIRONMENT, & SPATIAL SCIENCES)

In some sandy soils in northern Michigan, deep "tongues" form as percolating water carries dissolved substances (organic matter, Fe and Al) into the subsoil. Environmental conditions in northern Michigan set up well for such water flow, with a thick, melting snowpack each spring, and dependable fall rains. At our site near Strongs, Michigan, we analyzed how these tongues affect weathering of primary minerals, and soil acidity. We hypothesized that the added influx of water within tongues would have led to increased mineral weathering. Samples were collected from strongly and weakly developed tongues, and adjacent off tongue areas, through a sequence of different horizons and depths. To assess weathering, we collected geochemical data using a handheld-X-ray fluorescence unit. Soil geochemistry and pH data indicate that the strong tongues are more weathered, and more acidic, than weak tongues and off-tongue zones. These data support our hypothesis that the increased amount of water flowing preferentially through the tongues enhances weathering of sand grains. We also found that areas well below the tongues exhibit these same trends, suggesting that the soil processes extend to greater depths than is visually apparent.

ELECTROCATALYTIC UPGRADING OF FRAGMENTS OF BIO-OIL TO BIOFUEL; HIGHLIGHTING THE SYNERGISTIC INTERACTION BETWEEN THE MODEL COMPOUNDS

Christopher Klap

Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 238
Mentor(s): Benjamin Appiagyei (CHEMISTRY), James Jackson (CHEMISTRY)

Electrocatalytic hydrogenation (ECH) provides a new approach for the upgrading of bio-oil to biofuel. Bio-oil, the liquid product from biomass pyrolysis, can be reductively stabilized with ECH using Raney™ Nickel as the cathode under very mild conditions (75 °C, 1 atm, H2O as electrolyte). This approach comes with a general concern that the complex mixture of monomers and dimers in bio-oil readily undergo acid or base catalyzed polymerization, especially upon heating. They may also enhance or inhibit the catalytic reduction processes, so an understanding of such interactions is essential to success in moving from model systems to real bio-oil. Building on Dr. Jason Lam's recent study of ECH of guaiacol (2-methoxyphenol) positional isomers, where reactivity appeared to track with proximity between the methoxy group (hydrogen bonding acceptor) and the hydroxy group (hydrogen bonding donor) on the same molecule, we envisage to explore hydrogen bonding effects as a factor for reactivity. Using model compounds that represent lignin (the aromatic component of lignocellulosic biomass) fragments from bio-oil, measurements of reaction rates and selectivity as a function of concentration (H-bonding species) are investigated for the effects of hydrogen bonding within and between substrate molecules.

UPDATING MASS VALUES TO ACCURATELY SIMULATE X-RAY BURSTS

Kevin Mehta

Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 239
Mentor(s): Isaac Yandow (FACILITY FOR RARE ISOTOPE BEAMS), Ryan Ringle (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

X-ray bursts occur in low-mass X-ray binary systems where a neutron star and low-mass star orbit around one another. Because they are so close, the immense gravity of the neutron star draws matter from the companion star into a crust on the neutron star. A thin surface layer of mostly hydrogen and helium builds up on the surface; when it reaches a certain temperature and pressure, it ignites thermonuclear fusion. This heats the entire surface of the neutron star to extremely high temperatures, releasing a large number of X-rays. When the burst is over, the accretion continues, and the process is therefore repeated. Energy from X-ray bursts come from nuclear reactions on proton-rich isotopes. The rates of these reactions are largely determined by the difference in the mass values of the isotopes. That is why it is important to measure these masses as accurately as possible so we can generate a model of the X-rays emitted in the bursts using a computer analytical system. By comparing our simulation to observed data, we can extract stellar parameters such as the mass, composition, and age of the neutron star and its companion. However, physicists are using outdated mass values that can lead to incorrect results. In this work, we will show the effects of updating modern X-ray burst software to include the latest mass data from the Atomic Mass Evaluation in 2016.

ANALYZING DATA AND USING A LIGHT CUTTER IN AN EXPERIMENT THAT MEASURES THE RADIUS OF RARE ISOTOPES

Boyuan Hu

Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 240
Mentor(s): Kei Minamisono (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY), Kristian Koenig (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

My research program is part of a larger program that aims to measure nuclear charge radii of radioactive isotopes with collinear laser spectroscopy techniques. Low energy radioactive isotope beams produced at the National Superconducting Cyclotron Laboratory are bunched and superimposed with laser light. Laser resonant transition frequencies of radioactive atoms, from which a charge radius can be deduced, are measured by detecting fluorescence. The excitation of atom bunches by laser light must take place precisely inside the fluorescence detector for high-efficient measurements. To avoid laser-atom interactions elsewhere, the continuous-wave laser light needs to be cut under very precise control of timing, so that the laser light interacts with atoms exactly when the atom bunches enter the detector. An Acousto-Optic Modulator (AOM) will be used to cut the laser light. When the AOM is triggered by a voltage signal, a generator in the AOM introduces sound waves onto the crystal in AOM that diffracts laser light. When the generator is turned off, the laser light goes through the crystal, to be used for the collinear spectroscopy. My task is to introduce the AOM in the existing laser setup, quantify its operation characteristics, e.g., transmission and rise and fall time, and develop a timing scheme to be synchronized with the atom bunched beams. Details of the set up and results of tests will be presented.

SEARCHING FOR SHOCKS IN NOVAE FROM HARD X-RAY EMISSION

Alexa Gordon

Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 241
Mentor(s): Elias Aydi (PHYSICS-ASTRONOMY), Laura Chomiuk (PHYSICS-ASTRONOMY)

Novae are thermonuclear explosions 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 and in gamma rays. 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.

CONSTRAINING THE ORIGIN OF THE ALMA GAUCHA FORMATION (PATAGONIA, ARGENTINA)

Madison Kortas
Physical Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 242
Mentor(s): Chris Svoboda (CENTER FOR INTEGRATIVE STUDIES - GENERAL SCIENCE), Tyrone Rooney (EARTH AND ENVIRONMENTAL SCIENCES)

The Patagonia region within Argentina lies within the back-arc region of the Andes subduction system in which the Nazca plate and the Antarctic plate subduct beneath the South American plate. Volcanism in the Patagonian back-arc is known to occur due to either: (1) extensional tectonics, which formed the Chon Aike Large Igneous province ca. 150 Ma; (2) slab window volcanism beginning ca. 12 Ma. The existing paradigm explains all volcanism in this region on the basis of these two mechanisms. However, volcanism temporally intermediate to these established mechanisms may occur. Here we present new geochronologic and geochemical data on the Alma Gaucha Formation. We show that this unit erupted at 40.18 Ma, between the two previously recognized windows of volcanism. This raises the question as to the origin of this volcanism. The composition of primitive lavas of the Alma Gaucha formation can be used to probe the origin of magmatism. The lavas of the Alma Gaucha formation are not primitive, and evolved within the continental crust. We initially examined the liquid lines of descent of this formation using thermodynamic modeling (MELTS) and supplemented this with petrographic descriptions. We examined the whole rock geochemical data collected using XRF and ICP-MS techniques in order to compare composition of these lavas to exemplar lavas from the ca. 150 Ma and 12 Ma events. Our eventual aim is to constrain the possible models of origin of the Alma Gaucha formation and determine whether additional models need to be explored.

RECONSTRUCTION OF LOW ENERGY NEUTRINOS IN ICECUBE USING A 3D CONVOLUTIONAL NEURAL NET

Elizabeth Kowalczyk
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 421
Mentor(s): Brian Clark (PHYSICS-ASTRONOMY), Claudio Kopper (PHYSICS-ASTRONOMY), Jessie Micallef (PHYSICS-ASTRONOMY)

IceCube is a neutrino observatory in Antarctica which detects neutrinos by recording the light produced by the byproducts of interactions of neutrinos with nuclei in the ice. These interactions create charged particles that travel faster than the speed of light in ice, which then produce photons that are detected by a 3D array of 5,160 Digital Optical Modules (DOMs). The main goal of IceCube is to identify the astrophysical accelerators that create neutrinos, but it has also been used to better our understanding of the fundamental physics of neutrinos, such as oscillations at low energy (~50 GeV). This is accomplished by using the arrival times of observed photons to reconstruct the energy of the incoming neutrino using neural nets; which is a set of adjustable weights that has been utilized for image recognition, and can be repurposed for this goal. My 3D Convolutional Neural Net uses nearby DOMs to discover patterns in photon detection over time in order to predict the energy of the

incoming neutrino, which will contribute to our understanding of neutrino oscillations by constraining the mixing parameters.

STUDY OF NUCLEAR REACTIONS FOR PROTON THERAPY

Rachel White
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 422
Mentor(s): Artemisia Spyrou (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

Today cancer is still one of the leading causes of death in the developed world as an ongoing battle to beat it continues. Treatments such as radiation, surgery, and chemotherapy are used individually or in combination as a method of curing or lessening the effects of cancer. In recent years a new method of radiation therapy has emerged and that is proton therapy. Proton therapy has been gaining popularity due to its low entry dose of radiation in comparison to traditional cancer treatments. This means there is less radiation deposited on healthy tissue and a large amount of radiation is focused on the tumor. Despite advancements in this treatment area, some limitations still remain. One limitation is the lack of knowledge concerning the range of protons inside the body. New techniques for range verification have emerged in order to expand what is known about these ranges. A new method for range verification uses the characteristic gamma rays emitted from the interaction of the proton beam with an appropriate marker, which is inserted near the tumor. For the success of this method it is important to understand how the proton beam interaction with the healthy tissue can affect the measurements. The present work aims to examine reactions between protons and various isotopes found in abundance in the human body. The goal is to build a library of interactions that will provide insight into the future success of proton therapy.

ANION AND TETHER LENGTH CONTROL OF TOPOLOGY IN NITROBENZENE-DETECTING ZINC 3,3-DIMETHYLGLUTARATE DIPYRIDYL COORDINATION POLYMERS

Arian Pakray
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 423
Mentor(s): Robert Laduca, Jr (LYMAN BRIGGS COLLEGE)

A series of zinc 3,3-dimethylglutarate (dmg) coordination polymers bearing dipyridyl ligands has been prepared and structurally characterized via single-crystal X-ray diffraction. The specific zinc precursor and dipyridyl coligand employed in the synthetic regime resulted in wide topological diversity. {[Zn3(dmg)2(Hdmg)2(bpy)3(H2O)2]·4H2O}n (1, bpy = 4,4¢-bipyridine) shows a thick 1D ribbon structure based on bpy linkage of arc-like trinuclear [Zn3(dmg)2(Hdmg)2(H2O)2] fragments. {[Zn3(dmg)2(bpy)4](ClO4)2·H2O}n (2) exhibits a 3D 41263 pcu topology, based on 6-connected [Zn3(dmg)2] cluster units. {[Zn(dmg)(dpe)]·H2O}n (3, dpe = 1,2-di(4-pyridyl)ethane) manifests a very rare "double-rod" 658 self-penetrated 3D network dissimilar from the usual cds net with the same topological symbol. [Zn2(dmg)(dpp)2Cl2]n (4, dpp = 1,3-di(4-pyridyl)propane) displays 1D ribbons formed by dpp bridging of [Zn2Cl2(dmg)] dimeric units. {[Zn(dmg)(dpp)]·2.5H2O}n (5) has a two-fold interpenetrating 658 cds network. The thermal decomposition of all new phases is reported. All new materials were assayed as detectors for nitroaromatics in ethanol suspension.

PROBING THE MAGMA PLUMBING SYSTEM OF TYPE VI MAGMAS IN THE AFAR REGION OF ETHIOPIA

Julia Bassier

Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 424
Mentor(s): Tyrone Rooney (EARTH AND ENVIRONMENTAL SCIENCES)

The East African Rift within the Afar depression is at an advanced stage of the rifting process. This region is described as a triple junction wherein the Red Sea, Gulf of Aden, and East African Rift system converge. Within this region, magmas superficially resembling Mid-Ocean Ridge Basalts (MORB) can be found, which are defined as Type VI based on existing synthesis studies. Magmas of this type might be reflective of proto-oceanic lithosphere formation. However, Type VI magmas exhibit an unusual Ba-Sr enrichment not typically observed in MORB lavas. This enrichment has prompted previous workers to suggest that Type VI lavas originated in the Afar Plume and not the source of MORB. An unexplored complexity in the magma system that generated these lavas is the potential for the unusual Ba and Sr to be derived by contamination with crustal materials while the magmas pond and crystallize before eruption. We present a study of a suite of Type VI lavas exploring the geochemical and petrographic diversity within the suite. By undertaking whole rock geochemical analysis, and more focused petrographic examination of individual crystal phases, we probe the potential of magmatic mixing and crustal contamination as factors in controlling the composition of these Type VI lavas. We will use these initial survey results for planning more extensive spatially-constrained analyses using both Scanning Electron Microscopy and Laser Ablation Inductively Coupled Plasma Mass Spectrometry. Ultimately, this data will provide clarity as to the temporal development of the magmatic system from which these lavas are derived.

GADGET SYSTEM FOR NUCLEAR ASTROPHYSICS: GAMMA-RAY DATA ANALYSIS

Molly Janasik

Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 425
Mentor(s): Christopher Wrede (PHYSICS-ASTRONOMY)

We are working to understand scientific questions related to 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 developed the Gaseous Detector with Germanium Tagging (GADGET) system, a new experimental device at NSCL/FRIB. GADGET is composed of the Proton Detector and the Segmented Germanium Array (SeGA), which are used to measure protons and gamma rays (respectively) emitted following β-decay. In a recent experiment, GADGET was commissioned using two rare-isotope beams: a 25Si beam and a 23Al beam. The system was proven to operate successfully using both beams, and a detailed analysis is currently being done on the 23Al gamma-ray data from SeGA to extract the intensities and energies of gamma-ray transitions in 23Mg. We will use this information to search for new transitions to improve the decay scheme of 23Al to 23Mg. This will allow us to extract information regarding 22Na production in novae.

CHEMICAL COMPOSITION OF HYDROTHERMAL VENT FLUIDS AT THE EAST PACIFIC RISE 9ON AND THE IMPACT ON SEAWATER ELEMENTAL BUDGETS

Jack Walch

Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 426

Mentor(s): Dalton Hardisty (EARTH AND ENVIRONMENTAL SCIENCES)

Marine hydrothermal vents have wide ranging impacts on ocean biogeochemistry, spanning from supporting local chemosynthetic communities to impacting seawater elemental budgets on geologic timescales. Despite this, the spatial and temporal heterogeneities of the chemical compositions of hydrothermal vent fluids are not well constrained, limiting our understanding of the broader impact they have on ocean chemistry. The East Pacific Rise mid-ocean ridge at 9oN is among the most well-studied vent fields on Earth, with chemical records spanning the last 30 years. Here, we expand on the 9oN high-resolution temporal chemical record using samples collected over the course of 4 dives on December 10-14th of 2018 using the submersible HOV Alvin. We also attempt to provide new constraints on the flux of iodine, a biological nutrient and redox-sensitive element, to the ocean via hydrothermal fluids at mid-ocean ridges. Five hydrothermal vents, including both high temperature "black smokers" and low-temperature diffuse-flow vents, were sampled. Among the analyses performed on the samples were iodate measurements using UV-Vis spectrophotometry, ion concentration measurements using Ion chromatography, and a suite of 35 elemental concentrations using ICP-MS, including Mg, P, Ca, and multiple trace elements. By comparing the elemental composition of samples taken directly from the vent, the vent's plume, and the surrounding ocean, an accurate measurement of trace element concentration in the end-member vent fluid can be determined. We compare our findings to that of previous years at 9oN to assess local temporal variations, but also compare these hydrothermal fluxes to other mid-ocean and sedimented ridge localities.

DOPPLER-FREE LASER SPECTROSCOPY OF IODINE MOLECULE FOR LASER FREQUENCY CALIBRATION

Ryan Parker
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 427
Mentor(s): Kei Minamisono (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY), Robert Powel (PHYSICS-ASTRONOMY)

Our team is interested in the radius of radioactive short-lived nucleus. We use laser spectroscopy technique and measure atomic hyperfine spectra, from which a radius can be deduced. The laser light frequency has to be known accurately, since the nuclear effect in a hyperfine spectrum is very small. The iodine molecule has thousands of well-known electronic transitions in the visible to near-infrared range of light. These well-known transitions allow us to use the iodine molecule as a calibration source to accurately determine laser frequency. We have performed tests on the Doppler-free laser spectroscopy system of iodine molecule. I am analyzing data to characterize the collisional broadening of the resonance line shape and pressure shift of the transition centroid as a function of the cold finger temperature that determines the pressure of iodine vapor. Details of the Doppler-free laser spectroscopy system, the result of the characterization tests and the calibration of the laser frequency will be discussed.

NAIL POLISH QUALITY VS PRICE

Nikila Nallabelli
Physical Sciences, Poster Presentation
Section: 4, 1:00 - 2:30 PM
Presentation Number: 428
Mentor(s): Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Nail polish has been a big part of the culture and has been a way to express one's character and uniqueness. Over the years, many different forms of nail polish have emerged and have unique interesting properties. Specific nail polish manicures come at varying price points, but

does the price really correlate with the longevity and quality of the polish? This project will examine multiple different forms of nail polish including standard, shellac, and gel nail polish. The composition and microstructures of the polish will be examined using Scanning Electron Microscopy (SEM) and Electron Dispersive Spectroscopy (EDS). The results of these examinations will be evaluated with respect to previous literature findings to discuss an analysis of nail polish longevity and quality versus price.

PRELIMINARY PETRO-STRATIGRAPHIC FRAMEWORK FOR FLOOD BASALTS AT PELEKETCH (EAST AFRICA).

Bobby Yarger
Physical Sciences, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 615
Mentor(s): Alex Steiner (EARTH AND ENVIRONMENTAL SCIENCES), Tyrone Rooney (EARTH AND ENVIRONMENTAL SCIENCES)

The most significant thermochemical mantle anomaly on Earth is the African large low shear velocity province (LLSVP). While seismic techniques have provided unprecedented detail as to the shape of the LLSVP, direct probes of its composition require studies of magmas derived from it. Continental flood basalt provinces in East Africa preserve details on melting events precipitated by the interaction of the LLSVP with the African lithosphere. An underexplored region within the East African large igneous province is the Turkana basin, where significant sections of flood basalts have been recognized. These stratigraphic lava sections provide insights into the temporal variation of flood basalt lavas. We present a preliminary petrostratigraphic framework for a sequence of lavas at Peleketch. The aim of this investigation is to characterize the phases, abundances, and assemblages of the phenocrysts within the Peleketch basalts. These phenocrysts reveal insights into the magma plumbing system of the flood basalts, where they stalled, and how the magmas evolved within the crust. By ordering our petrographic data based upon lava stratigraphy, we can infer temporal changes in the magma plumbing system as it evolved through the lifetime of the flood basalt event. These data will provide a necessary framework for continuing studies that seek to probe the magma plumbing system using geochemical techniques via whole-rock and crystal analyses.

ROTATIONAL DIFFUSION DYNAMICS OF OXAZINE 725 IN A BINARY SOLVENT SYSTEM: IN SEARCH OF HETEROGENEITY IN THE SOLUTION PHASE

Austin Benedict
Physical Sciences, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 616
Mentor(s): Gary Blanchard (CHEMISTRY)

Oxazine 725 is a laser dye that is used in this work to understand whether or not two liquids mix randomly or exhibit molecular scale heterogeneity. By studying the rotational diffusion behavior of this dye in a binary solvent system, comprised of a polar aprotic solvent (DMSO) which is not capable of hydrogen bonding, and controlled amounts of a polar protic solvent (1-propanol) that is capable of hydrogen bonding, we will determine the uniformity of the solvent system at the molecular scale. The Oxazine 725 rotational dynamics will exhibit a linear dependence on the concentration of 1-propanol if the solution is homogeneous and a non-linear trend if the solution is heterogeneous. The results of this work have implications on chemical processes ranging from chemical separations to the synthesis of complex pharmaceutical compounds.

SEARCHING FOR CANNIBALISTIC SPIDERS IN OUTER SPACE

Jessie Miller

Physical Sciences, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 617
Mentor(s): Jay Strader (PHYSICS-ASTRONOMY), Samuel Swihart (PHYSICS-ASTRONOMY)

Multi-wavelength follow-up observations of unidentified gamma-ray sources have led to the discovery of numerous millisecond pulsar (MSP) binaries with non-degenerate companions. When the companion is low-mass and hydrogen-rich, they are classified as redbacks, after the cannibalistic spider. These systems are critical for understanding the physics of the pulsar spin-up process. Our group has pioneered a new method to discover such systems using new and archival datasets spanning across the electromagnetic spectrum. We begin by searching for X-ray sources inside the error regions of carefully selected 4FGL gamma-ray sources, using observations from the Chandra, Swift, and XMM-Newton X-ray missions. If the X-ray source has an optical counterpart, we look for evidence of optical variability consistent with orbital motion in a compact binary. Using our regular cadence with the SOAR 4m telescope in Chile, we quickly follow up these systems with optical spectroscopy, allowing us to fit for the orbital properties of the binary. Together with the inclination (inferred from fitting the optical light curve), these measurements can be used to estimate the mass of the MSP and infer the true counterpart to the gamma-ray source.

RESOLVING MAGMA DIFFERENTIATION PROCESSES WITHIN THE PATAGONIAN BACK ARC

Sydney Gable

Physical Sciences, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 618
Mentor(s): Tyrone Rooney (EARTH AND ENVIRONMENTAL SCIENCES)

Subduction in the Patagonia region of Argentina is marked by an unusual gap in the rate of seismicity that is normally present in the back arc environment of a subduction zone. Explanations for this absence of seismic activity include the presence of a slab window or "tear" in the subducting Antarctic Plate. The presence of a slab window would suggest that the volcanism occurring in this region is due to mantle material upwelling through this window. Lavas derived from melting of this mantle material provide clues of its origin, however these lavas may become contaminated during their transit through the crust. In this study, chemical signatures from samples of the La Angelita basalts are used to constrain the contamination and differentiation processes occurring in the magma plumbing system of the patagonian back arc. Initial petrographic work has been completed on a group of samples using petrogrographic microscopy and scanning electron microscopy (SEM). These analyses show populations of large, euhedral pyroxene and olivine crystals, some of which exhibit compositional zoning. Geochemical data was collected on pyroxene and olivine crystals using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) in order to constrain the chemical composition of zones within crystals and establish potential variations in crystal populations. These data are used to constrain the processes operating in the magma plumbing of these basalts, with application to ongoing work within our research group on the origin of volcanism in this part of Patagonia.

VISUALIZING NAIL POLISH UNDER A MICROSCOPE TO UNDERSTAND IT'S PROPERTIES

Akila Nallabelli

Physical Sciences, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 619

Mentor(s): Carl Boehlert (CHEMICAL ENGINEERING AND MATERIALS SCIENCE), Per Askeland (COMPOSITE MATERIALS AND STRUCTURES CENTER)

Different types of nailpolish have different properties and appeals to everyone. Although each type has its own unique way of attracting the eye, each of them wear at different rates. Gel nail polish is among the most trendy and popular types of nail polish for its glossy finish and long lasting abilities. Due to its unique composition of monomers and oligomers, it remains at a semi-solid/semi-liquid state which is then put under a UV light to harden. This allows it to wear at a slow rate and not chip easily so it is ideal for the customers but do all brands have the same wear rate? There are two popular brands of gel nail polish: Essie Gel and OPI. This project will examine different brands of gel nail polish by looking at the microstructure and arrangement of the monomers and oligomers in each brand using a SEM and EDS. The information of the microstructure of the nail polish and previous literature findings will be used to explain why one brand lasts longer on the nail than the other.

ENHANCING PERTURBATION THEORY FOR NUCLEAR MODELS WITH THE RENORMALIZATION GROUP

Garrit Reynolds, Luke Layman
Physical Sciences, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 620
Mentor(s): Heiko Hergert (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY), Scott Bogner (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

The Facility for Rare Isotope Beams (FRIB) will soon start producing exotic neutron-rich nuclei with a variety of complex structural features. Accurate and efficient numerical simulations of such nuclei are very difficult to achieve. For instance, perturbation theory (PT) is an efficient simulation technique that allows us to find approximate solutions for quantum systems by systematically improving on an educated guess. Unfortunately, the complexity of nuclear interactions renders such a perturbative step-by-step improvement inefficient. However, we can enhance PT using renormalization group (RG) methods to pre-process and tame the problematic features of nuclear interactions. Here, we will apply RGs to simple interactions models that nevertheless capture essential features of atomic nuclei, and explore the improvement we can achieve in perturbative simulations.

IMPROVING THE SYNTHESIS AND ISOLATION OF ASYMMETRIC EDGE CAPPED DOUBLE DECKER SILSESQUIOXANES (DDSQS)

Austin King
Physical Sciences, Poster Presentation
Section: 5, 3:00 - 4:30 PM
Presentation Number: 621
Mentor(s): Robert Maleczka (CHEMISTRY)

The synthesis of asymmetric double-decker silsesquioxanes (DDSQs) has been optimized and the yield of mono-borylated increased. The DDSQs have also been edge capped with silane and tin reagents to explore the structures of different DDSQs. The Ph8T8(OH)4 cage was used to obtain the crystal structures of the symmetrical tin and silane derivatives and as a stepping off point for the functionalization and identification of i-Bu8T8(OH)4.

PROBING THE EVOLVED GOMBE GROUP FLOOD BASALTS USING LA-ICP-MS OF MELT WITHIN PHENOCRYSTS

Erika Miciuda
Physical Sciences, Oral Presentation
Section: 6, 9:00 AM
Presentation Number: 860

Mentor(s): Alex Steiner (EARTH AND ENVIRONMENTAL SCIENCES), Tyrone Rooney (EARTH AND ENVIRONMENTAL SCIENCES)

Volcanism associated with rifting typically manifests as either: (1) volcanic centers and associated flows within the rift valley, or (2) extensive stratiform basalts that fill the rift. While fractional crystallization is the dominant process within the volcanic centers, the remarkable homogeneity exhibited by some stratiform basalts requires additional complexity within the magmatic system. The Pliocene Gombe Group lavas of Turkana (Kenya) and SW Ethiopia are such an occurrence of evolved homogeneous stratiform lavas. With such a homogenized group, constraining a source becomes difficult with the absence of a clear magma evolution trend. We performed a petrographic survey of the Gombe Group samples and discovered that some phenocryst phases house melt that was trapped as the crystals grew. These trapped melts likely preserve a greater diversity in the composition of the magma that formed the Gombe Group lavas as they were entrapped prior to pre-eruptive homogenization. Given the small size of these melt inclusions (30-60 microns), we performed a micro-analysis of their composition using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) of the melt inclusions and host phenocrysts. In total, we examined 11 melt inclusions hosted within 5 crystals of the Gombe Group lavasm whose data are used to expand the compositional diversity within them. We aim to establish the compositional vectors that inform us about the source of these lavas and how the magmas have evolved to their homogenized eruptive composition.

NAVIGATING THE REALM OF COMPUTATIONAL THINKING PRACTICES FOR INTRODUCTORY PHYSICS CURRICULUM

Theo Bott

Physical Sciences, Oral Presentation
Section: 6, 9:15 AM
Presentation Number: 861
Mentor(s): Daniel Weller (PHYSICS-ASTRONOMY), Danny Caballero (PHYSICS-ASTRONOMY), Paul Irving (PHYSICS-ASTRONOMY)

Computational thinking (CT) has recently emerged as a focal point of K-12 education due to the introduction of the Next Generation Science Standards. Within the last 15 years, numerous frameworks have outlined the practices involved when engaging in CT. These frameworks discuss how CT practices should be understood, implemented, and assessed in the classroom. While curricular expectations around this topic are becoming clearer, teachers (especially high school STEM instructors) still express a significant need for assessment strategies in the classroom. In light of this, we have begun the development of an assessment that will measure high school and early college instructors' perspectives on CT practices. Currently, we are developing an open-ended pilot survey which will help us understand which practices are relevant to teachers and how familiar teachers are with these practices. Once we have identified the CT practices that teachers are interested in evaluating, we can move on to the next step of the assessment development: creating an open-ended free-response questionnaire to administer to students.

PARTICLE IDENTIFICATION AWAY FROM THE BRAGG PEAK USING DE/DX

Isabella Ginnett

Physical Sciences, Oral Presentation
Section: 6, 9:30 AM
Presentation Number: 862
Mentor(s): Tim Bolton (EXTERNAL MENTOR), Glenn Horton-Smith (EXTERNAL MENTOR)

Particle identification (PID) is a crucial component of liquid argon time projection chamber experiments. Knowing track PIDs allows physicists to better understand the topology of neutrino interactions, which in turn can be used to study neutrino cross sections. A standard

particle identification technique involves analyzing dE/dx data right around a particle's Bragg peak, but this technique cannot always be utilized. This creates the motivation to investigate if the same dE/dx data away from a particle's Bragg peak can be used to create a new PID technique. Through my research, I investigated the plausibility of creating such a technique and what the limits of its applicability would be.

ISOTOPIC ABUNDANCES AND ATOMIC CHARGE STATES OF LANTHANIDES IN KILONOVAE

Pranav Nalamwar
Physical Sciences, Oral Presentation
Section: 6, 9:45 AM
Presentation Number: 863
Mentor(s): Jaideep Singh (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY), Luke Roberts (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

Kilonovae are optical transients associated with neutron star mergers (NSMs) and are powered by the radioactive decay of heavy elements created by the rapid neutron capture process (r-process). It is important to note the blue and red emission component from the kilonovae, along with their timescales, are greatly dependent on the abundance of the lanthanides and their various charge states in the merger material. To analyze these mergers and their abundances, we study the event through an Atomic Physics lens. In particular, we investigate how varying atomic data inputs affect the total abundance of these unique elements. To do this, we use elemental abundances calculated by Skynet, a nuclear reaction network code, and uncover how distinct isotopes evolve over time due to variables such as temperature and electron fraction. Using these calculated elemental abundances, the Saha equation, and NIST ionization data we predict the ionization state populations of lanthanides on timescales similar to the expected time of the kilonova peak. Our report details how a multi-element merger material evolves over time. This work is supported by Michigan State University (MSU), the Honors College of MSU, and the Joint Institute of Nuclear Astrophysics.

A LOOK INTO THE SUBATOMIC WORLD - QUANTUM CHROMODYNAMICS

Madison McMahan
Physical Sciences, Oral Presentation
Section: 6, 10:00 AM
Presentation Number: 864
Mentor(s): Andrea Shindler (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

As technology advances new means of scientific study arise. As to not reach a plateau, researchers must understand new complex topics. The topic in this study is quantum chromodynamics. An area that is in layman's terms, the study of the so-called strong interactions. The strong interactions are one of the four fundamental interactions in nature and are responsible for binding together the building blocks of the universe, protons and neutrons in nuclei along with the structure of the protons and neutrons themselves. To better understand the true scale of these interactions it is useful to know that the average ant is 10^-3 meters in size, while the size of the system we want to study is roughly 3 femtometers or 3*10^-15 meters. Not even a powerful microscope can show us interactions at this scale. In order to "see" what happens at a subatomic level, data must be used to create visualizations. A visualization of such phenomena has been created using Visit rendering software. A series of written python files interact with the Visit software to generate a four-dimensional representation of the subatomic world. Multiple sets of data were used to depict different scenarios with the purpose of further investigating the microscopic dynamics of strong interactions. Visualizations of strong interactions can be extremely useful and provide new insights in the understanding of quantum phenomena at such a small scale.

PETROSTRATIGRAPHIC CHARACTERIZATION OF THE EOCENE TO EARLY OLIGOCENE FLOOD BASALTS OF THE LOKITAUNG GORGE, TURKANA (EAST AFRICA)

Rayn Phillips

Physical Sciences, Oral Presentation
Section: 7, 1:30 PM
Presentation Number: 874
Mentor(s): Tyrone Rooney (EARTH AND ENVIRONMENTAL SCIENCES)

Large igneous provinces and related flood basalt eruptions represent the greatest flux of mass transferred from Earth's mantle to the surface. The composition of flood basalts, however, do not resemble that of the magma created at initial mantle melting. This is due to substantial modification that occurs as the magma transits through the lithosphere to the surface. Liquids extracted from magmatic differentiation systems erupt as discrete flood basalt lava layers. A collection of these flows, therefore provides insight into the temporal evolution of these magmatic differentiation systems. Stratigraphically constrained sections, where an unbroken series of flows is preserved, can be utilized to probe these magma differentiation processes. Our project focuses on the Eocene to early Oligocene Turkana flood basalts of Northern Kenya. We present novel petrographic and chemical data collected from flow-by-flow analysis. Our results show disequilibrium with the host magma, indicated by reaction rims evident on phenocryst phases, particularly clinopyroxene. Deep crystallization, perhaps in the lower crust, is suggested by pressure twins in these clinopyroxene grains. However, shallow crystallization that contrasts with the deep sourced clinopyroxene is indicated by the abundance of plagioclase. This points to a complex plumbing system, which we will probe using better constraints of the P-T conditions obtained through microanalysis of the crystal phases in our samples to determine their chemistry and relationship to the host magma.

PARTICLE IDENTIFICATION WITH A NEURAL NETWORK

Tom Ladouceur

Physical Sciences, Oral Presentation
Section: 7, 1:45 PM
Presentation Number: 875
Mentor(s): Man-Yee Tsang (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

To understand properties of nuclei, nuclear physicists at FRIB study particles that are emitted from nuclear collisions, similar to investigators getting clues about a crash accident from gathering debris in crash sites. Ideally, information about the identity, momentum (or energy), spatial positions of the particles emitted from nuclear collisions should be measured in a nuclear physics experiment. In this presentation, I will focus on how particles are identified and how the procedure can be improved using neural network. The current method used to recognize the particles is time consuming, and tedious. In order to apply machine learning technique, I took simulated data of nuclear collisions that resemble real data. I trained the computer to identify the particles based on their 3D spatial and momentum information and their loss in energy going through the detector. I then compared this to the traditional method of making graphical cuts on a 2D particle ID plot of momentum vs energy loss of the particles. At first the results looked as though the traditional method was still more accurate. However, with fine tuning such as filtering background noise and refining the results by comparing to more realistic data, we expect the neural network method will improve yielding more accurate and reliable results.

DETECTING DARK MATTER: GAPS SENSITIVITY TO ANTIHELIUM

Emma Brann

Physical Sciences, Oral Presentation
Section: 7, 2:00 PM

Presentation Number: 876
Mentor(s): Charles Hailey (EXTERNAL MENTOR)

The General Antiparticle Spectrometer (GAPS) experiment aims to detect antimatter as a signature of dark matter. At low energies, the predicted flux of antinuclei with baryon number A < -1 is orders of magnitude higher than the cosmic ray background, making these antinuclei, particularly antideuterons, a smoking gun signature of beyond the standard model physics. The Alpha Magnetic Spectrometer experiment has claimed several tentative antihelium-3 and antihelium-4 detections, which see even lower cosmic ray background than antideuterons. GAPS is uniquely suited to validate these claims. GEANT4 simulations reveal that GAPS is sensitive enough to detect antihelium, potentially providing insight into the nature of dark matter and probing new possibilities in physics.

NEUTRON INTERACTIONS IN GRETINA

Charlie Hultquist
Physical Sciences, Oral Presentation
Section: 7, 2:15 PM
Presentation Number: 877
Mentor(s): Remco Zegers (NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY)

The Gamma-Ray Energy Tracking In-Beam Nuclear Array (GRETINA) is a high-resolution γ-ray spectrometer produced at Lawrence Berkeley National Laboratory and used at a variety of laboratories, including the National Superconducting Cyclotron Laboratory. GRETINA consists of segmented germanium crystal detectors that are subject to high-energy neutron damage via the destruction of the crystal lattice structure. Recently, GRETINA was used in a (t, 3He + γ) probe of the 86Kr nucleus, where a triton beam was accelerated towards Krypton gas cell, contained within two Kapton foils (C22H10N2O5). t(p, n) 3He events from interactions with Hydrogen in the Kapton foil were isolated to study the interactions of neutrons in GRETINA. As the neutron direction and energy are known on an event-by-event basis, this study allows for the clean characterization of neutron-induced reactions in GRETINA. Neutron-induced peaks and other phenomena were identified in the measured spectra from neutron-γ events in the Germanium crystals. These experimental results are compared to Geant4 simulations to study the efficacy of simulations to replicate neutron interactions in GRETINA. Improved understanding of such interactions will allow for better prediction of neutron background and damage in future GRETINA and GRETA experiments.

PLANT SCIENCES

EFFECT OF PLANTING YEAR ON GRANIVORE PRESENCE AND SEED REMOVAL

Aidan Pace
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 163
Mentor(s): Christopher Catano (PLANT BIOLOGY), Lars Brudvig (PLANT BIOLOGY)

The addition of native plants' seeds is integral to many restoration efforts. Granivores can alter plant establishment by consuming seeds; however, the effects of seed consumer type (e.g., small mammals vs. insects) and preferences among seeded species are not well understood. At Lux Arbor Reserve in Michigan, we studied the seed preference of (small mammals and insects on restoration plots of multiple ages with the use of seed removal trays. We answered the questions: Does restoration age affect granivore activity? Does one group prefer a specific seed species over others? At what rate are 4 prairie plant species' seeds removed by insects and small mammals? From the data obtained we discovered that the age

of the plots did not have an effect on the rate of granivory of insects, but plot age did affect the rate of granivory of rodents for two of the focal species. . We also found that the granivore species present in the experimental plots prefer Monarda fistulosa over the other common prairie species applied to the trays. Between the four focal species, we found that rodents were the primary seed removers for Desmodium canadensis in all planting years. Rodents also removed more seed in 2015 for Rudbeckia hirta and Sorghastrum nutans. These results provide valuable information for possible alterations to seed spreading in restoration efforts to mitigate the effects of granivores at different developmental stages of restoration plots like increasing the density of M. fistulosa in seed mixes increase the probability of establishment.

EMS MUTAGENESIS PRODUCES RUST PHENOTYPE IN BRACHYPODIUM

Trent Garner

Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 164
Mentor(s): Federica Brandizzi (PLANT RESEARCH LABORATORY), Sang-Jin Kim (PLANT RESEARCH LABORATORY), Starla Zemelis-Durfee (GREAT LAKES BIOENERGY RESEARCH CENTER)

Humans are using up fossil fuels for energy at a rapid rate which has led to increased pressure to utilize renewable resources such as biofuels. One solution can be found in using plants as biofuels. The grass species Brachypodium distachyon functions as a model organism and produces a glucose polymer known as Mixed-Linkage Glucan (MLG) which can be highly useful in the agro-industrial field with its water solubility and simple composition. The gene known as CSLF6 as well its biosynthetic pathway that produces MLG in Brachypodium have been characterized. Following the characterization of CSLF6, transgenic Brachypodium plants overexpressing CSLF6 (CSLF6OX) were generated and the transformants showed higher levels of MLG as expected, but their growth was stunted. To counteract this, we set up ethyl methanesulfonate (EMS) mutagenesis to identify genetic factors that increase growth in the stunted CSLF6OX plants. Ideally, this would increase both plant biomass and levels of MLG. Multiple CSLF6OX lines were treated and have been screened for restoration of growth phenotype. Among 8 lines screened so far, one phenotype of interest has been discovered. However, instead of increasing plant height, the plants remained stunted and produced a brown banding pattern on the leaf (termed rust). Based on phenotypic ratios in the next generation of rust plants, it is confirmed that the phenotype is caused by a recessive allele. Now, further work is being done to target the gene producing the rust phenotype to identify factors affecting disease resistance in plants.

ELEVATED LEVELS OF CHLOROPHYLL CONTENT AND MORE NEGATIVE LEAF TEMPERATURE DIFFERENTIAL VALUES IN MALES OF DIOECIOUS SPECIES LINDERA BENZOIN

Evan Ziehl, Mariam Sayed, Ryan Wakley

Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 165
Mentor(s): Corrine Higley (BIOLOGICAL SCIENCE PROGRAM)

Lindera Benzoin is a dioecious species, containing separate male and female plants. Research has suggested that male specimens of Lindera benzoin (Spicebush) experience increased growth rates, larger shoots, increased longevity, and are considered to have a competitive advantage over females. By testing the differences in photosynthetic capabilities of randomly sampled Spicebush plants, we were able to compare a number of specific traits between males and females. Our research primarily focused on four quantitative measurements of leaf

properties. These include the ratio of incoming light used for non-photochemical quenching (PhiNPQ), the ratio of incoming light lost to non-regulated processes inhibiting photosynthesis (PhiNO), relative chlorophyll content, and leaf temperature differentials. This information was compiled and used to identify relationships between these factors and the sex of Lindera benzoin plants. Our analysis revealed that higher chlorophyll levels, lower PhiNO values, and more negative leaf temperature differentials in males were present in comparison to females. Although there were significant differences between males and females, it doesn't necessarily mean that female plants were less healthy. Further research is needed to better understand how specific photosynthetic processes relate to plant health and growth. Future experiments to test this idea may include testing female specimens of Lindera benzoin and determining the specific amount of energy expended towards bearing fruit during the seasonal months. This could be contrasted to energy expended during non fruit-bearing periods, to allow a better understanding of how specific photosynthetic processes relate to the overall plant health and growth rates between male and female Lindera benzoin.

OBSERVING THE EFFECTS OF HERBIVORY AND GIBBERELLIC ACID ON RADISH FLOWERS

Marissa Nufer
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 167
Mentor(s): Ava Garrison (KELLOGG BIOLOGICAL STATION), Jeffrey Conner (KELLOGG BIOLOGICAL STATION)

Agricultural landscapes have become prominent ecosystems across the world that humans depend on for fuel, food, and fiber. This ecosystem creates the perfect breeding ground for weeds, in particular, Raphanus raphanistrum, more commonly known as wild or weedy radish. R. raphanistrum does not self-fertilize, and its rapid evolution makes it an optimal model to study weed evolution. Since radish is self-incompatible it must rely on pollination to ensure fitness, floral traits being a key component to attracting pollinators; however, due to a finite amount of resources, radish, like all other organisms, faces trade-offs in maximizing fitness. Gibberellic acid is a vital hormone in plants that regulates growth, photosynthesis, and metabolism—all important factors of plant fitness. Herbivory on plants induces the production of jasmonates—defense regulating hormones—inhibiting gibberellin signaling, and thus, inhibiting plant growth. The purpose of this experiment is to test the effects gibberellic acid and herbivory have on floral traits of native radish populations from Spain. Weedy radish is a descendent of native radish but show little response to exogenous GA compared to native radish. To look at these effects I planted two native Spanish populations of radish in Ft. Schemske and laid out a full factorial design using GA application and induced herbivory for my treatments.

EXPRESSION ANALYSIS OF WEEP IN SOLANUM LYCOPERSICUM (TOMATO) AND NICOTIANA TABACUM (TOBACCO)

Elise Tomaszewski
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 168
Mentor(s): Andrea Kohler (HORTICULTURE), Courtney Hollender (HORTICULTURE)

Understanding what controls tree shape is essential to both landscapers and fruit tree growers. Tree fruit has been a staple in large landscapes for their spring flowers and their food production and weeping phenotypes of traditional plants, like cherries, can be extremely prized. Controlling the pendulous phenotype in tree fruit could be advantageous for

landscapers as well as aiding growers to have tree fruit branches better suited for 2-D planting systems. Previously, a gene that produces a weeping phenotype in Prunus persica (peach) was identified and named WEEP. WEEP is highly conserved within vascular plants, yet its function remains unknown. In trees, higher expression of this gene is found in the nodes, internodes, and phloem. One challenge of understanding the mechanisms behind tree fruit architecture is their slow growth rate. In this experiment, Solanum lycopersicum (tomato) and Nicotiana tabacum (tobacco) were used as model species because they have a significantly shorter life cycle while still possessing woody secondary growth. To elucidate WEEP function, expression levels were tested in tomato and tobacco tissues at both the vegetative and floral stages. Expression was determined for a detailed series of tissue including the roots, leaf tissue, petiole, node, internode, and shoot apical meristem. Preliminary data, along with publicly available RNAseq data, suggests that WEEP is expressed throughout all tissue types, with high expression in roots, flowers, and fruit. Identifying expression patterns could reveal the molecular mechanisms by which this gene regulates branching angle.

PHYLOGENETIC ANALYSIS OF RHIZOCTONIA ASSOCIATED WITH SOYBEAN AND DRY BEAN IN MICHIGAN BASED ON RIBOSOMAL ITS SEQUENCES

Gerta Hysa
Plant Sciences, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 169
Mentor(s): Janette Jacobs (PLANT, SOIL, AND MICROBIAL SCIENCES), Martin Chilvers (PLANT, SOIL, AND MICROBIAL SCIENCES)

Rhizoctonia solani is a destructive soilborne plant pathogen with a broad host range and world-wide distribution. Isolates of this species-complex are typically arranged in taxonomically distinct groups based on the cell nuclear condition and hyphal anastomosis criteria, although the genetics of the anastomosis phenomena are poorly understood. In an effort to identify the Rhizoctonia associated with root rot disease in soybean and dry bean, 312 putative Rhizoctonia isolates were obtained from surveyed areas throughout Michigan in the 2011-19 growing seasons. Identification of anastomosis groups (AGs) was performed using sequencing of the internal transcribed spacer (ITS) region of ribosomal DNA which had 97-100% identity with corresponding gene sequences of respective R. solani AGs in NCBI. Phylogenetic analysis of the ITS region of rDNA further confirmed the AG identity of the isolates (36 binucleate and 255 multinucleate) and revealed that 44% of the multinucleate isolates belonged in anastomosis group AG 2-2. No significant genetic differences were found between the AG groups isolated from soybean and dry bean. In the majority of cases, the results from the phylogenetic analysis were consistent with the ITS sequence; however, there were instances where AG 2-2 isolates didn't cluster together according to ITS sequences. The AG 2-2 diversity can be attributed to heterokaryotization. While this study encourages the use of the ITS region for fast identification of R. solani isolates into their respective anastomosis group, it also emphasizes the need to develop better tools to differentiate isolates within the AG 2-2 anastomosis group.

INFLUENCE OF TAC, LAZY, AND WEEP ON GRAVITROPIC PREENTATION TIME IN ARABIDOPSIS THALIANA

Phillips Nguyen
Plant Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 339
Mentor(s): Frank Telewski (PLANT BIOLOGY)

Gravitropism plays a vital role in the orientation of the shoot and root in plants. The genes LAZY1, TAC, and WEEP appear to influence the ability of a plant to respond and possibly perceive gravity. For a plant to perceive the gravitational stimulus, it must be displaced from the gravitational vector for a predetermined time, the presentation time. Within this study, I will determine the time required for the 1st curvature in plant shoots for the genes LAZY1, TAC, WEEP, and wildtype of Arabidopsis Thaliana. I hypothesize since these plants have similar growth genes being expressed. They will have a similar presentation time and curvature angle. This experiment is currently conducted within the time span of 2-3 months. There are one and a half trays (48 plants) of each mutant and the wildtype. They will have 3-5 days of chilling to stimulate germination. They will grow for 4-5 weeks until the floral spikes are 5-9 cm tall. Then I will label 7 plants of each gene with 2 min, 4 min, 6 min, and 8 min, and each experiment will have one plant of each gene with no orientation. The labeled times are the 90 degrees orientation before putting the plant upright again. In each experiment, a picture will be taken every 30 seconds for 3 hours to calculate curvature and the labeled time curvature begins. There will be two more experimental replications. The research is inconclusive and in progress.

ELUCIDATING THE GENETIC ARCHITECTURE OF CIRCADIAN PERIOD AND ASSOCIATED PHENOTYPIC EFFECTS IN POTATO

Amni Azhar
Plant Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 340
Mentor(s): Eva Farre (PLANT BIOLOGY)

The circadian clock regulates rhythmic behavior of plants, enabling plant adaptation to daily and seasonal environmental changes. However, the role of circadian clock on an important vegetable crop such as cultivated potato is yet to be discovered. A previous study demonstrated that the circadian periods of wild potato species correlated with the latitude of origin, such that species originating near the equator have a short, ~21 hours period, and species from further south in South America have a longer (~26 h) period. In contrast, cultivated potato species grown at high latitudes have short circadian periods. In order to identify genes that control the circadian period in potato, we performed a quantitative trait loci (QTL) study. We phenotyped the circadian period on a segregating diploid population of potato. This population is formed by F1 lines generated from a cross between S. chacoense M6, which has a long period (~24hrs) and SUP19, a dihaploid from cultivar Superior, which has a short period (~21hrs). Genotype and agronomic trait data are already available for the population, and combined with the circadian phenotype data we will be able to find QTLs that modulate circadian traits and their association with potato growth and development. This experiment will help us to gain an insight into the mechanism of the circadian clock in potato.

COMPARING FLORAL INITIATION TIMING BETWEEN EARLY- AND LATE-BLOOMING SOUR CHERRY TREES

Asyraf Azmi
Plant Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 341
Mentor(s): Charity Goeckeritz (HORTICULTURE), Courtney Hollender (HORTICULTURE)

Bloom time is a highly heritable trait that is important for temperate fruit trees because flowering quality directly translates to yield. In Michigan, irregular spring freezes can damage the flower buds of fruit trees and reduce the crop. To combat this problem, this research aims to understand why some trees bloom later than others by studying a population of sour

cherry trees that segregate for flowering time. A previous study identified a large-effect QTL on chromosome 4 that accounted for 27.9% of the bloom time variation in this population. A certain haplotype of this QTL, known as the 'k allele', associates with later bloom time. Late-blooming trees in this population inherited 2 copies of the k allele while the early-blooming trees inherited none. Since flower development in Prunus occurs over the span of nearly a year, it is crucial to study the development of the flowers all year to identify the stage(s) vital for bloom time differences. In this study, the initiation time of the flowers was determined for 3 early- and 3 late-blooming siblings' tree in mid-summer using histological methods. This timing was correlated to other developmental events, such as annual shoot growth and fruit development. The results are speculated as they relate to final bloom time. This work is important because understanding the regulation of bloom time will prevent crop loss.

ASSESSING FUNGICIDE RESISTANT ISOLATES OF COLLETOTRICHUM ACUTATUM IN MICHIGAN BLUEBERRIES

Matthew Uebbing
Plant Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 343
Mentor(s): Timothy Miles (PLANT, SOIL, AND MICROBIAL SCIENCES)

Anthracnose fruit rot of blueberry (causal agent Colletotrichum acutatum) is difficult for growers to manage and requires use of effective fungicides. In 2014, a few isolates of Colletotrichum acutatum from Michigan blueberries were identified as resistant to FRAC 11 fungicides (quinone outside inhibitors: QoI). To obtain a more current idea of the presence and distribution of resistance in Michigan, 268 C. acutatum isolates from eight Michigan blueberry growing regions (North Muskegon, Ravenna, Nunica, West Olive, Holland, South Haven, Grand Junction and Bloomingdale) were collected and screened for resistance to FRAC 11. Each isolate was grown on media amended with either 1ppm azoxystrobin or 0.5ppm pyraclostrobin. All plates contained SHAM (Salicylhydroxamic acid). Percent inhibition was calculated by comparing the diameter of mycelial growth on the amended media (fungicide + SHAM) to the unamended media (SHAM only). Percent inhibition was used to group isolates into three phenotypes: resistant, moderately resistant, and susceptible. Out of 268 isolates screened in the study, 79% were resistant, 6% were moderately resistant and 15% were susceptible. Most susceptible isolates were from northern growing regions. Other research groups have found different single nucleotide polymorphisms (SNPs) in the cytochrome B gene of Colletotrichum acutatum to be associated with different levels of resistance. To supplement our poison agar data, DNA was isolated from each phenotype and partially sequenced to determine if SNPs of interest were present. A molecular assay is being developed to enable growers to identify the phenotypes of their field isolates to ensure only effective fungicides are applied.

NO DIFFERENCE IN LEAF RETENTION IN SEXUALLY DIMORPHIC LINDERA BENZOIN

Katherine Lauro, Selena Martinez
Plant Sciences, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 344
Mentor(s): Corrine Higley (BIOLOGICAL SCIENCE PROGRAM)

Research suggests that differences in energy and resource allocation between males and females in sexually dimorphic Lindera benzoin affects growth and reproductive output. Due to the additional energy females put toward reproduction, they experience a higher reproductive cost than males, resulting in them exhibiting less reproductive output and growth throughout their lifespan. Our study focused on how this affects leaf retention between males and females of the deciduous shrub L. benzoin. To investigate this, we

identified 19 male and 19 female L. benzoin and counted 50 leaves back from the tip of one branch on each individual, then marked the branch with tagging tape. We counted the leaves on each marked branch every week for 5 weeks. After the data were collected, we calculated the mean number of leaves remaining on male and female L. benzoin each week. We found there was no significant difference in leaf retention between the two sexes. This suggests that differences in energy and resource allocation in sexually dimorphic L. benzoin do not significantly impact leaf retention. Even though there was no significant difference in leaf retention rates between the two sexes, other factors that may be impacted by differences in energy allocation between male and female L. benzoin are overall rates of growth and leaf emergence in the spring.

THE RELATIONSHIP BETWEEN TREE AGE & PHOTOSYNTHETIC EFFICIENCY

Erin Martin, Jennifer Entrup, Rachna Parikh
Plant Sciences, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 342
Mentor(s): Corrine Higley (BIOLOGICAL SCIENCE PROGRAM)

Previous research has shown that as trees increase in age, the rate of gas exchange in their leaves decrease. These studies followed the amount of oxygen and carbon dioxide exchanged in the leaves and detected that saplings have a higher photosynthetic capacity. These findings led us to investigate how the age of Acer saccharum trees (also known as Sugar Maples) may alter their photosynthetic efficiency. The results expressed a linear negative relationship between Phi2 (light intensity) and PhiNPQ (wasted energy) for the mature and sapling tree age-groups. Mature trees thrived, photosynthetically, at higher intensities of light and were under stress at lower intensities, while the opposite was seen for saplings. We believe this difference occurred because saplings and mature trees have a vast difference in the number of leaves they hold. Thus, at higher light intensities, light can be evenly distributed for mature trees because they often possess more foliage. Yet, for saplings, the number of leaves is limited, causing the strength of the light intensity to damage the saplings cells, creating stress. The results do not indicate that one age is more efficient than another but rather that stress and efficiency factors differ significantly between the two.

PHOTOSYNTHESIS AND LEAF PIGMENT CONTENT UNDER COLD STRESS IN ARABIDOPSIS GENETICALLY ENGINEERED TO EMIT ISOPRENE

Jacob Silvester
Plant Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 525
Mentor(s): Sarathi Wijetilleke (PLANT RESEARCH LABORATORY)

Isoprene (2-methyl-1,3-butadiene) is the most prevalent volatile organic compound produced by plants and is known to protect plants from abiotic stresses such as heat and oxidative stress. Isoprene can alter expression of genes involved in abiotic stress tolerance. Salicylic acid (SA) is important for improving cold tolerance, and isoprene suppresses genes important for SA biosynthesis. However, the specific effect of isoprene on plant responses to cold stress is not known. We hypothesize that under cold stress, plants emitting isoprene will incur more damage than non-emitting plants. This hypothesis was tested using five lines of Arabidopsis: wild-type Col-0, three transgenic lines expressing Eucalyptus globulus isoprene synthase (B2, C4, F2), and empty vector controls. Plants were initially grown at 23oC daytime and 20oC nighttime temperatures. When four weeks old, plants were separated into four groups and subjected to the following temperature treatments: 1. control at 23°C, 2. cold stress at 4°C, 3. control with 30°C/24h heat priming, 4. cold stress with 30°C/24h heat priming. After induced to cold stress, photosynthesis and isoprene emissions were measured weekly for the

following four weeks. Leaf tissue samples were also harvested on a weekly basis for pigment analysis. Anthocyanin was extracted using a methanol-HCl (0.1% HCl, v/v) solution following a modified protocol from Murray and Hackett (1991). Chlorophyll was extracted using 96% ethanol following a modified protocol from Lichtenthaler and Wellburn (1983). The effects of isoprene on photosynthesis and leaf pigment accumulation under cold stress and the role of isoprene in cold tolerance will be discussed.

MAPPING QUANTITATIVE TRAIT LOCI FOR CHLOROPLAST COVERAGE IN THE PLANT ARABIDOPSIS THALIANA

Emily Graham
Plant Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 526
Mentor(s): Emily Jennings (PLANT BIOLOGY), Katherine Osteryoung (PLANT BIOLOGY)

Chloroplasts, photosynthetic organelles, arose via endosymbiosis of a cyanobacterium by a eukaryotic cell. Chloroplast division is necessary for the photosynthetic capacity and replication of populations of chloroplasts. The division of chloroplasts affects their coverage in a cell. Chloroplast Coverage (CC), the total planar area that the chloroplasts in a given cell occupy, is tightly regulated in the plant cell, though the regulatory mechanism is unknown. Using Arabidopsis thaliana, we will identify Quantitative Trait Loci (QTL) linked to CC. Quantitative traits are influenced by genes at different loci, leading to noticeable phenotypic differences. To identify genes linked to CC, we obtained a mapping population of Recombinant Inbred Lines (RILs) generated from a cross between Arabidopsis accessions Ler-0 and Kas-2, which have been used in other QTL experiments and are genotyped. This population was chosen based on a difference of 29% in CC between the parents, and the ready availability of the mapping population. We will measure CC from fluorescent images of leaf mesophyll cells from the RIL population, and using this data in combination with the available genotypes, will create a rough map to identify potentially causal regions of the genome. These findings could lead to the genetic engineering of greater photosynthetic capacity in plants. Greater photosynthetic capacity will allow for healthier plants, producing more food. Additionally, further knowledge of chloroplast compartment size regulation in plants could contribute to a better understanding of compartment size regulation of other organelles such as mitochondria, more broadly relevant to plants and animals.

GETTING TO KNOW YOUR NEIGHBOR: IDENTIFYING BIOGENESIS FACTORS THAT INTERACT AND BUILD THE CHLOROPLAST ATP SYNTHASE COMPLEX

Emily Diederich
Plant Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 527
Mentor(s): John Froehlich (PLANT RESEARCH LABORATORY)

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. 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 then finally inserted into the thylakoid membrane? To address these questions, we have employed a new technique called "Proximity Labeling of Interacting Proteins", which allows one to characterize protein

complexes. Currently, from our lab and others, two Biogenesis Factor proteins, BFA1 and BFA3, have been identified which are involved in the building of the ATP synthase complex. However, the mechanism by which both BFA1 and BFA3 function is not well understood. We envision that by employing a "Proximity Labeling" time-course approach we will be able to elucidate the pathway that BFA1 and BFA3 use to construct the ATP synthase complex. In addition, the "Proximity Labeling" approach should also allow us to identify additional 'biogenesis factors' not identified by classical genetic approaches. Finally, a hypothetical model showing how BFA1 and BFA2 assemble the ATP synthase complex will be presented.

OPTIMIZATION OF A GNOTOBIOTIC PLANT GROWTH SYSTEM FOR PLANT MICROBIOME RESEARCH

Jennifer Martz
Plant Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 528
Mentor(s): Bradley Paasch (PLANT RESEARCH LABORATORY), Sheng-Yang He (PLANT RESEARCH LABORATORY)

One area of particular interest to scientists is how plants, microbiome and environment interact to influence plant health and productivity in natural ecosystems and crop fields. To better allow for the study of plants grown in the absence of microbiota or in the presence of defined microbial communities the He Lab recently developed a potting soil-based gnotobiotic plant growth system called GnotoPots. However, it was discovered that plants grown in this system may have suppressed immune responses in comparison to conventionally grown plants. Plants grown in the GnotoPot system are exposed to increased relative humidity and nutrient levels. Using a variety of immunity assays, I examined whether these abiotic factors contribute to immune suppression in GnotoPot-grown plants. Indeed, I found that when humidity levels are decreased, plants become more responsive to immune elicitors. Moreover, I found that when nutrients are reduced, immune responses of colonized plants, but not plants grown without exposure to microbiota, become robust. This indicates that the presence of excess nutrients may inhibit microbial-mediated immune maturation in plants. My study so far has resulted in important preliminary insights into how plant immune response, microbiome and environmental conditions interact. My subsequent studies aim to further optimize the nutritional component of the GnotoPot system to facilitate its widespread use in the study of plant-microbiome-environment interactions.

THE RELATIONSHIP BETWEEN BLUE LIGHT PHOTORECEPTORS AND POLYUNSATURATED FATTY ACID BIOSYNTHESIS GENES IN N. OCEANICA MICROALGA

Rachel Clark
Plant Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 529
Mentor(s): Eva Farre (PLANT BIOLOGY)

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. In the microalgae Nannochloropsis oceanica CCMP1779, blue light has been found to increase the expression of fatty acid desaturase genes involved in PUFA biosynthesis. The genome of N. oceanica CCMP1779 encodes for three proteins of the Aureochrome family, which are blue light photoreceptors. Aureochromes contain light sensing and DNA binding domains. Therefore, I hypothesize that Aureochromes mediate the blue light induction of fatty acid desaturase (FAD) genes. To test this hypothesis, we have measured the expression of FAD

genes in N. oceanica Aureochrome mutant lines and I am utilizing a yeast one-hybrid system for testing direct binding of the Aureochromes to the FAD promoters. N. oceanica mutants were grown under blue light versus dark conditions, then were analyzed to determine the amount of expression of FAD genes. Results showed that the wild type had much higher FAD gene expression under blue light, while mutants with an Aureochrome knockout showed similar expression of FAD gene expression regardless of the light condition. For the yeast one-hybrid system, preliminary results indicate there is no difference in transcription whether or not the Aureochrome is present in the cell.

FUNCTIONAL ANALYSIS OF MITOCHONDRIAL CARRIER PROTEINS IN ARABIDOPSIS

Thomas Young
Plant Sciences, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 530
Mentor(s): Bibin Paulose (PLANT BIOLOGY), Danny Schnell (PLANT BIOLOGY), Emily Pawlowski (PLANT BIOLOGY)

Novel strategies to increase crop productivity are required to meet rising demands from ever increasing population and prepare for the potential negative impacts of an unstable climate. This includes crop adaptations that allow for more efficient usage of resources to deal with abiotic and biotic stresses such as drought, flooding and disease. Mitochondrial carrier proteins have been observed to greatly impact the growth and success of plants. We previously studied the impacts of the mitochondrial carrier protein, LIP36, from Chlamydomonas reinhardtii in the oilseed crop, Camelina sativa. Under limiting environmental conditions, LIP36 plays an essential role in mitochondrial metabolism, improving resilience by improving carbon assimilation, increasing water and nitrogen use efficiency, andincreasing seed yields. We hypothesize that LIP36 functions by transporting dicarboxylates into the mitochondria for use in the TCA cycle, thereby improving photorespiration, decreasing oxidative stress, and increasing anaplerotic metabolism. To test this hypothesis, we will investigate the ability of LIP36 to complement T-DNA insertional mutants in known mitochondrial dicarboxylate transporters from Arabidopsis thaliana (DIC1, DIC2, and DIC3). Detailed analysis of these lines will reveal more insight into the physiological role of dicarboxylate transporters in plants.

QUANTIFYING SEVERITY OF TAR SPOT DISEASE ON MAIZE

Sidney Sitar
Plant Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 711
Mentor(s): Addie Thompson (PLANT, SOIL, AND MICROBIAL SCIENCES)

Tar spot disease in maize is caused by Phyllachora maydis, an ascomycete fungi. This disease is native to Central and South America, but has recently appeared in the north central United States, where it is rapidly spreading through the Midwest and threatening yield. Since tar spot is new to the area, nothing is known about the resistance of temperate-adapted material to the disease. This research was conducted to assess the disease severity of tar spot in different genotypes of maize. 200 lines from the Germplasm Enhancement of Maize (GEM) program and 343 lines from the Wisconsin Diversity Panel were planted in two replications in the field and investigated for disease resistance to Phyllachora maydis. These populations were selected to include a wide range of diverse tropical and temperate genetic sources, while still able to flower in Michigan. Disease severity ratings on a categorical percent scale were taken five times in each of the 1,086 plots. Portions of the field displayed significantly higher disease ratings than others due to the non-uniform spread of natural inoculum. Other phenotypes including plant height and flowering time were also collected from this field

experiment and were analyzed for correlations with disease severity. Identifying sources of resistance to tar spot and understanding the connection of disease severity with genotype and the environmental conditions present will allow for future management and prevention of the disease, which will focus more on host plant resistance instead of costly or ineffective fungicides.

LEAF DOMATIA IN MID-MICHIGAN WOODY PLANTS: FLORISTICS, FREQUENCY AND VISUALIZING DOMATIA

Riley Scanlon
Plant Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 712
Mentor(s): Marjorie Weber (PLANT BIOLOGY)

Leaf domatia, specialized structures on the backside of leaves, mediate a mutualistic relationship between plants and mites that protect leaves against pathogenic fungi and small herbivorous arthropods. I assessed the occurrence of domatia on native woody species of Michigan using herbarium specimens of 93 plant species all native to Michigan, comprising a total of 23 different families. To visualize domatia and compare their morphology across species, I evaluated domatia types and created scanned and enlarged images. Of the 93 plant species observed, 65 had mite domatia, 37% of which held pouch type morphology and 38% held dish type domatia morphology. Differences in domatia morphology stem from the anatomy of the upper and lower mesophyll tissues and the presence or absence of tissue around the opening. Pouch type domatia consist of semi-covered openings either by trichomes or other tissue. Dish type domatia seemingly have no opening and can be covered in the same way but usually have little coverage. Pit type domatia have the least coverage around the opening and act like an open pit. The high frequency of leaf domatia in native woody species of Michigan indicates that mutualistic plant-mite interactions are more widespread in Michigan native plant communities than previously recognized. Tree species with mite domatia mutualisms may make up a large part of the forest canopy relative to other species in Michigan forests. As an effort to promote a broader understanding of mite domatia, a gallery of photographs was created for viewing by educators and the public.

EFFICACY OF BIOCHAR SOIL AMENDMENT ON VELVET LEAF (ABUTILON THEOPHRASTI) ON MYCORRHIZAL COLONIZATION AND NUTRIENT UPTAKE

Camryn Brent
Plant Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 713
Mentor(s): Jessica Miesel (PLANT, SOIL, AND MICROBIAL SCIENCES)

Emerging research suggests that biochar amendments to degraded soil may enhance plant productivity by increasing soil carbon content and promoting nutrient availability. However, various biochar types have different properties that may influence nutrient retention and cycling. Plant nutrient acquisition is aided by root-associated mycorrhizal fungi. Therefore, it is important to understand how different biochar types affect the relationships between plants, mycorrhizae associations, and soil nutrient availability. Our goal was to determine the role of two types of biochar on velvet leaf (Abutilon theophrasti) productivity, mycorrhizal colonization rates, and soil nutrient availability. We hypothesized that addition of biochar will increase nutrient retention in soil, thereby increasing associations with mycorrhizae and plant biomass production. Our experiment consisted of 56 pots, each planted with two velvet leaf individuals whose roots were separated by a compartment constructed of mesh screen. Each pot was inoculated with mycorrhizae and amended with one of two biochar types. We applied three nutrient treatments (N, P, or N + P) to the mesh screen compartment weekly.

The mesh allowed only the mycorrhizae to pass through. After 7 months of growth, we measured above and belowground plant biomass and determined the percentage of mycorrhizal colonization associated with the plant roots. We also determined the amount of plant-available N and P in soils. Preliminary results of biomass suggests that biochar application may have negative or no effects on velvet leaf growth. These findings are counter to our hypothesis and reveal the need for further research testing the effectiveness of biochar as a soil amendment.

OBSERVING SDHIS FUNGICIDE RESISTANCE IN BOTRYTIS CINEREA USING PHENOTYPIC AND GENOTYPIC APPROACHES

Nik Nikzainalalam
Plant Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 714
Mentor(s): Safa Alzohairy (PLANT, SOIL, AND MICROBIAL SCIENCES), Timothy Miles (PLANT, SOIL, AND MICROBIAL SCIENCES)

Botrytis cinerea is an important phytopathogenic fungus causing grey mold in many economically valuable crops, including grapes and strawberries. Site specific fungicides, such as succinate dehydrogenase inhibitors, SDHIs, (FRAC 7) have been used to manage the pathogen, but resistance has been noted within B. cinerea populations as the pathogen mutates within 3 of the 4 subunits (B, C, and D) of the succinate dehydrogenase enzyme complex. Previously, 104 B. cinerea isolates were collected in the years of 2014 and 2018 from various Michigan grape and strawberry fields and were phenotyped as being sensitive or resistant to commercially available SDHIs, fluopyram and boscalid. Using a subset of these isolates that were resistant to boscalid or boscalid and fluopyram, the EC50 of other 5 new SDHIs, (Pyraziflumid, Kenja, Aprovia, Fluxapyroxad, and Miravis), was determined.
he objectives of this study were to (1) determine the discriminatory dose(s) for all 7 SDHIs and phenotype the 104 isolates using mycelial growth assay, (2) establish frequency of resistance and examine for cross-resistance between the tested SDHIs within various B. cinerea isolates, and (3) identify the genetic mutations-associated with resistance within the isolates. Findings will assist in determining the genetic diversity of Botrytis populations and allow for the development of diagnostic assays to test for genetic resistance, which subsequently helps determine an effective fungicide spray program.

A GENETIC ANALYSIS ON THE INVASIVE SUCCESS OF CALIFORNIAN BRASSICACEAE SPECIES

Abby Wittkamp, Emily Parker, Jaclyn Melasi
Plant Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 715
Mentor(s): Patrick Edger (HORTICULTURE)

Sisymbrium irio, also known as 'London rocket', is an invasive plant found throughout southwest California. Caulanthus amplexicaulis var. barbarae is endemic to California, adapted to serpentine soils throughout the San Rafael Mountains. While their ranges overlap, there is no evidence of interaction between the two species. By analyzing their genomes, along with preferred soil composition, phenology, and reproductive strategies, this study aims to identify the genes that contributed to major differences that discourage competition between these species. This research seeks to understand the complex relationship between genetics and ecology, and can be used as a foundation for future studies. In an era of rapid global change, it is now more important than ever to understand the dynamic interactions between organisms and their environment; protecting native species from exploitative foreign species will now be at the forefront of conservational research.

GENOMIC IDENTIFICATION OF EXTREMOPHILIC TRAITS

Ava Rivard, Emma Filary, Jonah Varney

Plant Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 716
Mentor(s): Patrick Edger (HORTICULTURE)

The family Brassicaceae (~3,700 species) consists of numerous cultivated species, ranging from broccoli to mustards to bok choy. Wild relatives of these crops are native on every continent except Antarctica and many have adapted to various extreme environments. This study aims to identify the genes that permitted certain extremophiles in this family to survive in unique high-salinity and low-temperature environments.Schrenkiellia parvula is able to survive in extreme conditions such as low temperature (5°C) and high salinity environments (LD50 in NaCl is 600 mM). Other species included in this study include Sisymbrium irio, a low temperature extremophile, and Thellungiella halophilia, a high salinity extremophile. Arabidopsis thaliana served as outgroup in the family which doesn't share these extremophile traits. We will present the results from our comparative phylogenomic analyses aimed at identifying adaptive genes in these species.

FLOWER POWER: IDENTIFYING GENES INVOLVED IN FLOWER PIGMENTATION AND SIZE

Ambika Salwan, Emily Stecevic, Katie Levandowski, Roxy Lisowsky

Plant Sciences, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 717
Mentor(s): Patrick Edger (HORTICULTURE)

The family Brassicaceae (>3,700 species) displays remarkable diversity in petal pigmentation and flower size which, in part, is driven by shifts in plant-pollinator interactions. This study aims to identify the genes that have contributed to variation in these floral traits in certain species. The research focused on the species Lunaria Annua, Arabis Alpina, Cakile Maritima, Thlaspi Arvense, and Rorippa Islandica. These species are indigenous to different habitats yet contain similar floral characteristics. Furthermore, we conducted phylogenetic analyses to estimate the number of plant-pollinator shifts that have occurred over the past 54 million years of evolution. Results from these analyses will be presented.

PSYCHOLOGY

PSYCHIATRIST SHORTAGE AND MENTAL HEALTH PARITY LAWS: BARRIERS TO TREATMENT

Emily Corbeille

Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 73
Mentor(s): Matthew Grossmann (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH)

Across America, one in five people face a problem associated with mental health or substance abuse. However, less than half of these suffering individuals are receiving the adequate services that they need. Mental illness affects a person's capability to work, desire to play a part in their communities, and ability to maintain healthy relationships. Mental health parity is used to describe the equal treatment of mental illness and substance use conditions in insurance plans. The Mental Health Parity Act of 1996, and the Mental Health Parity and

Addiction Equity Act of 2008, are two federal policies examined in this study, alongside the varying state-to-state regulations. Michigan is widely known for its conditions being worse-off in terms of these health coverage laws. A large obstacle that exemplifies this issue is the growing psychiatrist gap. While the need for treatment increases, the number of psychiatrists is dropping. Based on the American Board of Medical Specialties data, there are 47,406 board-certified psychiatrists that can be used as the baseline for collection and comparison. This study is set out to examine how the proximity, slot availability, and insurance limitations of these federal and Michigan specific policies correlates to an individual's unlikeliness, or inability, to receive help.

MATERNAL DEPRESSIVE SYMPTOMS AND INFANT TEMPERAMENT OUTCOMES IN A HIGH-RISK POPULATION

Arsh Singh
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 74
Mentor(s): Alytia Levendosky (PSYCHOLOGY), Kristyn VanDahm (PSYCHOLOGY)

Research suggests a link between maternal postpartum depressive symptoms and difficult infant temperament. Difficult temperament is conceptualized as child difficulty in regulating emotions and adaptation to novel situations. Temperamental intensity and adaptability are two subscales examined in studies of difficult temperament. We chose to investigate associations between these subscales and depressive symptoms in an at-risk sample of pregnant women, half of whom were exposed to Intimate Partner Violence (IPV). Previous literature suggests that IPV and maternal depression are significantly associated with lower levels of adaptability and higher levels of fussiness in infants. However, few have examined these associations in high-risk diverse samples with attention to infant temperament. We hypothesize that maternal postpartum depressive symptoms will be positively associated with difficult temperament indexed as higher infant intensity and lower levels of adaptability after controlling for IPV. Data from the Prenatal Stress Study, a longitudinal study examining the impact of various stressors during pregnancy on women and their infants, will be used. Women participate in multiple interviews from pregnancy to 6 months postpartum. The current study utilizes preliminary data from participants who have completed the Carey Infant Temperament Scales and the Edinburgh Postnatal Depression Scale at 6 months postpartum. About half of the participants identified as African American, endorse being single and have a high-school education. Approximately 54% of the infants are male. Correlation analyses will be used to determine associations between maternal depressive symptoms and temperamental subscales. Findings will support existing literature and future research on maternal mental health and early childhood.

THE EFFECT OF ENERGY DRINKS ON MOOD, SLEEPINESS, AND COGNITION

Chris William, Matthew Martz, Trishul Kalapuram
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 75
Mentor(s): Kimberly Fenn (PSYCHOLOGY)

Energy drink companies often claim that the B-vitamins and caffeine in their drinks improve cognition, however, little work has been done to empirically investigate these claims and any cognitive enhancement may solely be due to caffeine in the drinks. Thus, we investigated the effects of B-vitamins and caffeine on mood, sleepiness, and a variety of cognitive processes. We recruited 236 undergraduate students to participate in a 2x2 study with caffeine and B-vitamins as between-subject factors. Participants were randomly assigned to one of four conditions, under double blind assignment: caffeine, B-vitamins, caffeine and B-vitamins

combined, and placebo. Participants took surveys that measured subjective sleepiness and mood and completed a task that measured attentional vigilance, before they consumed an opaque capsule. They completed the same tasks again, as well as tasks assessing working memory and attention , after an absorption period. We found an interaction with caffeine on sleepiness and positive affect . Participants who did not consume caffeine became sleepier over the 90-minute session, whereas those who did consume caffeine did not become sleepier. There was no effect of B-vitamins on sleepiness. We also found an interaction between B-vitamins and caffeine on negative affect. B-vitamins increased negative affect when participants did not have caffeine, but had no effect when participants received caffeine. We did not find any evidence that caffeine or B-vitamins affected other cognitive processes. This work further develops our understanding of the effects of B-vitamins and caffeine on cognition and increases consumer awareness on the effect of energy drinks.

EXAMINING TEST TAKING STRATEGIES FOR WORKING MEMORY TESTS

Becca Gross
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 76
Mentor(s): Christopher Nye (PSYCHOLOGY), Hyeyoung Yoon (PSYCHOLOGY), Lauren Collier (PSYCHOLOGY), Sergio Marquez (FAMILY MEDICINE)

Cognitive ability tests are used to determine intelligence and capability in many settings (Berry 2015). Companies are increasingly considering the role of a specific type of cognitive ability known as working memory, which is important for reasoning and decision-making. Nevertheless, past research has shown that there are disparities in scores on cognitive ability tests between different racial groups, particularly African Americans and White Americans (Berry 2015). Further research revealed that at least part of these disparities arise due to the test taking strategies that African Americans are using because they are ineffective (Dollinger and Clark 2012; Nguyen, O'Neal, and Ryan 2003). Moreover, limited access to resources can hinder the development of effective test taking strategies and test preparation (Ellis and Ryan 2003). Given the growing importance of working memory tests, the present research aims to minimize those disparities through examining which test strategies are most effective. In the present research, 540 undergraduate students completed a series of working memory tests and recorded what strategies they used. Through thematic coding of qualitative responses we examined the degree to which each strategy related to performance on a Letters and Numbers Reasoning test. In future studies, we hope to take the most effective strategies and teach them to others to see if using a common strategy can reduce subgroup differences across races and socioeconomic status.

THE EFFECTS OF NAPPING ON CONSOLIDATION OF SYNTHETIC SPEECH

Ankita Rao, Nick Harb, Sai Abburi
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 77
Mentor(s): Kimberly Fenn (PSYCHOLOGY)

In today's diverse society, the ability to comprehend distinct speech patterns is essential for productive communication. Individuals are capable of learning new speech patterns and dialects, and sleep benefits this learning. Previous research has shown that a full night of sleep stabilizes generalized learning of distorted, synthetic speech and protects it from subsequent interference and that a 90 minute nap can prevent loss of learning. Given these findings, we seek to determine how a midday nap will influence the consolidation of generalized learning of synthetic speech. Participants completed three sessions. At 09:00, participants were trained and tested on computer-generated synthetic speech. At 15:00,

participants returned to the laboratory and were randomly assigned to either a 60, 30, or 0 minute nap opportunity. Nap participants were set up with partial polysomnography to track quantity and quality of sleep. At 21:00, participants returned and completed a final test. We will examine the change in performance (i.e. ability to understand synthetic speech), from the morning to evening. Consistent with prior work, we expect that the group that does not nap will show a degradation of performance across the day but that the groups that nap will show less loss. We also expect that stronger evening performance will be related to Stage 2 sleep spindle activity during the nap. These findings reveal more about the neural correlates involved in memory consolidation and may have implications for patient populations such as those with speech and language disorders.

WHICH STRATEGIES ARE MOST EFFECTIVE? EXAMINING TEST TAKING STRATEGIES FOR PERFORMANCE ON MATRIX REASONING TESTS

Aver McKay, Lauren Collier
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 78
Mentor(s): Christopher Nye (PSYCHOLOGY), Lauren Collier (PSYCHOLOGY), Sergio Marquez (FAMILY MEDICINE)

Cognitive ability tests are being used for placement in an assortment of positions, from college entrance exams to job interviews. One test that has been used is a working memory test. Working memory is a construct that explains the way short term memory is used in cognitive situations. These cognitive tests may not measure what we think they do, because life experiences as well as training for these tests can impact how well participants score. This may be because of differences in access to preparation materials and educational background, among other things, that may put certain groups of people at an advantage. Previous research has shown that African-American students used more ineffective test-taking strategies (Ellis and Ryan, 2003). The purpose of this study is to analyze strategies that are used by students taking these cognitive ability tests, to identify strategies that can be taught to those with less access to training. This study was conducted on undergraduate students. Students completed multiple cognitive tests and were asked to report the strategies that they used for each individual test. There is a strong correlation between working memory performance and standardized tests designed to measure intelligence. Based on this, it is possible that improving working memory could also increase intelligence (Conway and Getz, 2010). If strategies that are used in these matrix reasoning tests can be identified and taught, it could potentially lessen the disparity between those who have had the opportunity to practice for these exams and those who have not.

EFFECT OF ATTENTION ON AFTERIMAGES

Julia Evanski, Stephen Fong
Psychology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 79
Mentor(s): Jan Brascamp (PSYCHOLOGY)

Afterimages are due to 'fatigue', or adaptation, of cells in our visual system that respond to the original scene. When the adapted cells no longer give off as strong a signal as they would in the unadapted state, other visual cells may be able to produce an "opposite" perception to the original image. Past research has provided conflicting evidence as to the direction and influence of attention on after-images. Some suggest that attending to a stimulus will weaken its afterimage, while others suggest that attending to a stimulus will strengthen its afterimage. Our research aims to test the hypothesis that both findings are correct. We hypothesize that different individuals will exhibit opposite effects of attention on

afterimages. Under this view, afterimages arise due to the adaptation of phase-sensitive cells early on in the visual system, but the signal that carries the afterimage must be passed on by phase-insensitive cells higher up in the visual processing stream. If attention primarily increases adaptation of the former kind of cells then afterimages appear stronger; if it primarily increases adaptation in the latter kind of neurons, then afterimages appear weaker. Participants will be presented a screen with two ovals simultaneously and they will be asked to pay attention to one of the ovals but not the other. After the images disappear they verbally report the afterimages they perceive, to quantify which afterimage is perceived as stronger: the afterimage of the attended oval or that of the non-attended one.

DOES SLEEP DEPRIVATION DIRECTLY IMPAIR HIGHER-ORDER COGNITIVE MEASURES SUCH AS PLACEKEEPING?

Nataly Dawood
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 80
Mentor(s): Elle Wernette (KELLOGG CENTER), Kimberly Fenn (PSYCHOLOGY)

Sleep deprivation impairs lower-level cognitive processes such as attention, but the effect on higher-order cognition remains unclear. Attention is a component of more complex cognitive processes. Therefore, attentional lapses may be responsible for all deficits in higher-order cognition caused by sleep loss. In contrast, we recently found evidence that sleep deprivation impairs performance on placekeeping, a higher-order cognitive function essential in many complex tasks, even after controlling for the effect of deprivation on vigilant attention. Our placekeeping measure in that study relied predominantly on verbal memory and used a single test of attention. The current study investigated the effect of sleep deprivation on visuospatial placekeeping (Letterwheel), vigilant attention (Psychomotor Vigilance Task (PVT)), and spatial attention (Multiple Object Tracking Task (MOT)). Participants completed these tasks in the evening and were randomly assigned to stay awake overnight in the lab or sleep at home. In the morning, all participants repeated these tasks. Preliminary data show that sleep-deprived participants made more errors on the Letterwheel task in the morning than rested participants. Sleep-deprived participants also had lower accuracy on the MOT task and more attentional lapses in the PVT task compared to rested participants. Thus, sleep deprivation impairs visuospatial placekeeping and two types of attention. We investigated the extent to which these attentional impairments can explain impairments in visuospatial placekeeping. The results of these analyses indicate impairments in attention completely mediate visuospatial placekeeping deficits. Given these results, sleep deprivation may have no direct effect on this higher-order cognitive measure.

EMOTION REGULATION IN CHILDREN WITH AUTISM SPECTRUM DISORDER: INVESTIGATING OUTCOMES USING A THIN SLICE APPROACH

Claire Henderson
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 81
Mentor(s): Kristin Rispoli (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

Children with Autism Spectrum Disorder often have a difficult time regulating their emotions, and parents are ideal intervention agents to support their acquisition of emotion regulation skills. This project will examine changes in parents' support for children's emotion regulation, and children's regulatory skills following participation in the Regulation of Emotional Lability in Autism through Caregiver Supports (RELACS) intervention program. Outcomes were measured using brief, "thin slice" ratings from 37 untrained observers who viewed 2-minute

video segments of parents and children interacting in play-based activities. Results will provide additional evidence for the potential efficacy of RELACS when implemented by parents of young children with Autism Spectrum Disorder and information about the reliability and validity of thin slice ratings. In order to further assist children with Autism Spectrum Disorder in regulating their emotions, it is imperative to understand if this intervention is beneficial.

LONELINESS, PERSONALITY, AND THE COLLEGE STUDENT

Chloe Redeye
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 82
Mentor(s): John Waller (HISTORY)

The aim of my research project was to investigate (a) whether there is a correlation between the Big Five personality types and levels of individual loneliness on university campuses and (b) whether the frequency of loneliness on average changes over the four years of a student's college experience. In order to do so, I analyzed, under the supervision of Dr Brent Donnellan of the Department of Psychology, a data-set of 1,155 participants compiled at the University of Texas-Dallas. Although previous research has focused on the Big Five Personality traits and loneliness, there have been very few studies of the trajectory of loneliness among college students or of the possible correlations between personality and loneliness among university students. My study found that the average loneliness of the college students in the data-set increased until year 3 semester 1, decreased until year 4 semester 1, and then slightly increased again for the last semester. It was also found that extraversion ($r(1,156)=-.16$, $p<0.01$), agreeableness ($r(1,156)=-.12$, $p<0.01$), and conscientiousness ($(1,156)=-.15$, $p<0.01$) were all negatively correlated with loneliness, while neuroticism ($r(1,156)=.43$, $p<0.01$) and loneliness were positively correlated, and openness to experience and loneliness were not correlated. These findings were consistent with other research regarding the link between Big Five Personality traits and loneliness.

LOOKING ON THE BRIGHT SIDE: THE PROTECTIVE EFFECTS OF OPTIMISM ON EMOTIONAL REACTIVITY

Braden Kilpatrick, Jay Parmar, Will Eckerle
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 83
Mentor(s): Christopher Webster (PSYCHOLOGY), Darwin Guevarra (PSYCHOLOGY), Jason Moser (PSYCHOLOGY)

Higher levels of optimism are robustly associated with improved emotional well-being and psychological adjustment. Optimism's effect on emotional well-being has been attributed to its ability to enhance coping mechanisms during distressing situations. However, it is possible that optimism may also influence how people experience distressing situations altogether before coping strategies are activated. In this way, optimism may serve as a buffer to unpleasant situations before modulating "downstream" emotion regulation processes. The present study examined whether trait-level optimism can buffer emotional reactions to unpleasant stimuli. Participants passively viewed both mild and highly arousing negative images while continuous electroencephalogram (EEG) data was recorded. Real-time emotional reactivity was measured by the late positive potential (LPP), an evoked event-related potential time-locked to image viewing. Combining both mild and highly arousing negative images, we find that high optimism was negatively associated with LPP amplitude. Separating the images, the effect was driven by mildly arousing images, such that optimism diminished LPP amplitude on mildly arousing trials, but less so with highly arousing trials. The

present findings suggest that on top of optimism's effect on coping strategies, it may also reduce emotional reactivity following mild emotional disturbances and less so for severely distressing experiences.

PREDICTING PROGRAM ENGAGEMENT IN A PARENT-MEDIATED INTERVENTION FOR CHILDREN WITH AUTISM SPECTRUM DISORDER

Grace MacDonald
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 84
Mentor(s): Brooke Ingersoll (PSYCHOLOGY)

Parent-mediated intervention (PMI) is an evidence-based practice in which parents are taught to use intervention techniques to help their child develop social and communication skills and to manage their child's behavior. Recently, there has been interest in delivering PMIs via telehealth to expand access to these interventions. Studies have demonstrated that various factors predict parent engagement in both traditional (without the use of technology) and telehealth-based PMIs. This research examines predictors of parent program engagement in Project ImPACT, a PMI for young children with ASD, delivered via telehealth. Participants include 41 caregivers of children with ASD (80.5% female), who enrolled in a full-scale RCT of Project ImPACT Online. They were randomly assigned to either complete the program at a self-directed pace or with the support of a coach. We utilized the percent of the program that parents accessed to measure their engagement, or degree of involvement, in the program. We predicted that parent motivation, expectations about the intervention, program acceptability, and technology fluency would positively predict program engagement. Results from this study could improve support services and usability of PMIs for parents of children with ASD.

ASSOCIATIONS BETWEEN SELF-REPORTED PARENTING AND PARENT REPORTS OF CHILD BEHAVIOR PROBLEMS IN EARLY CHILDHOOD

John Chen
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 85
Mentor(s): Catherine Durbin (PSYCHOLOGY)

A range of studies have previously indicated relationships between positive and negative markers of parenting and children's internalizing and externalizing behaviors (Williams et al., 2009; McKee et al. 2007). Negative parenting behaviors are associated with internalizing behaviors and depressive symptoms (Dallaire, 2010; Gryczkowski et al., 2009; Pittman, 2001). The current project uses data from community samples of young children (3 to 7 years old) to explore how parenting styles relate to children's internalizing and externalizing behaviors. The Alabama Parenting Questionnaire (APQ) was completed by parents to assess parenting styles and the behaviors of the children were assessed through the Child Behavior Checklist (CBCL). The current project explores three APQ subscales (warmth, discipline, and involvement), whilst the CBCL will indicate levels of internalizing and externalizing behaviors. Sex of the child will also be analyzed as research has shown sex to be a relevant factor for comparing outcomes (Rinaldi, 2012; Gryczkowski et al., 2009). I propose two hypotheses: (1) Low warmth, inconsistent/harsher discipline, and low involvement will correlate with higher internalizing and externalizing behaviors (2) Boys will exhibit more externalizing behaviors and girls will tend to exhibit more internalizing behaviors in the face of negative parenting, inconsistent/harsher discipline, and low involvement. Analyses will include bivariate correlations and regression. The current project will replicate previous research questions

about parenting effects on child behavior, and perhaps elucidate potential differences between the various levels of outcomes in positive or negative parenting styles.

DIFFERENCES BETWEEN MATERNAL EMOTION REGULATION & PERCEIVED INFANT TEMPERAMENT

John Chen
Psychology, Poster Presentation
Section: 2, 9:00 - 10:30 AM
Presentation Number: 86
Mentor(s): Alytia Levendosky (PSYCHOLOGY), Kristyn VanDahm (PSYCHOLOGY)

Research suggests that maternal psychopathology negatively impacts child development while maternal emotion regulation capacities are believed to underlie various forms of psychopathology. Environmental factors such as maternal stress may also exacerbate the negative effects on child outcomes. The literature also suggests associations between maternal psychopathology and mothers' perceived temperament of child. However, little research has examined maternal emotion regulation and child temperament in ethnically diverse samples or those exposed to intimate partner violence (IPV). The current study examines whether maternal report of infant temperament differs between women high and low in emotion regulation. We'll be using data from the Prenatal Stress Study - an ongoing study examining the effects of stress across pregnancy on maternal and child outcomes. Women participate in five interviews from pregnancy to 6 months of infant age; preliminary data from the 6-month visit will be used. The sample includes largely ethnically diverse, lower income, and single women. For the infants, 54% are male. Measures used include two self-reports: Carey Infant Temperament Scales and Difficulties of Emotion Regulation Scale. We hypothesize that mothers with low emotion regulation will endorse lower mood and higher intensity with regard to child temperament. Analysis of Covariance will be used to determine whether there are any mean level differences in child temperament for women endorsing high versus low emotion regulation, controlling for demographic risk and IPV exposure. Results will contribute to the existing literature and can inform future research related to maternal emotion regulation in at-risk samples of women and their children.

ETHNIC IDENTITY AND GROUP INTERESTS AMONG WHITE AMERICANS

Margaret Amshay
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 243
Mentor(s): C. David Navarrete (PSYCHOLOGY)

As the proportion of white Americans decline in the population, ethnic identity among white Americans is becoming more salient. Emerging perspectives in political psychology suggests that white identity may not be linked to xenophobic attitudes or economic variables as much as it once was, and is instead linked with a sense of group self-interest. In a broad sample of white Americans, we studied the demographic and psychological predictors of two distinct measures of white ethnic identity: positive white identity and white self-consciousness. Our initial analysis of a representative sample of white Americans (YouGov, N = 1,000) revealed significant bivariate correlations among these measures of ethnic identity, ethnic group interests, racial bias, political orientation, and several demographic factors. However, demographic and racial bias influences were attenuated when entered into a multiple regression with psychological variables. In addition, we found that two variables measuring white group interests (group position and cultural loss) trumped demographic variables, political orientation or racial bias in predicting positive white identity and white self-consciousness. Implications of the salience of ethnic identity among white Americans is further discussed.

MIMICRY DURING INTERPERSONAL COORDINATED MOVEMENTS

Cynthia Sridhar, Jess Truong, William Quackenbush
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 244
Mentor(s): Carrie Kroger (PSYCHOLOGY), J McAuley (PSYCHOLOGY)

Mimicry is a common element of human behavior. When musicians perform together in a group, they synchronize movements using both spatial and temporal cues. Hove and Keller (2010) showed that individuals synchronizing rhythmic finger tapping with a video of a tapping finger matched the height of their finger motion with the height of the finger in the video. The present study extends this work by exploring movement mimicry when two individuals tap in synchrony together. Two experiments investigated interpersonal dynamics between pairs of participants who tapped both alone (solo tapping) and together (paired tapping). Participants tapped with their index finger along with a rhythmic metronome and continued tapping at the same pace when the metronome stopped. In Experiment 1, both participants were in the room for the duration of the study. In Experiment 2, each tapper left the room while the other completed solo tapping. Continuous motion tracking was used to record movement dynamics. Examination of the series of inter-tap-intervals revealed that participants tended to tap faster during paired tapping compared to solo. Examination of tap amplitude (finger height between taps) and dwell time (duration the finger rested on the table), showed that participants matched their movement dynamics during interpersonal synchronization (paired tapping), but not when tapping alone (solo tapping). Correlations of tapping dynamics between individuals revealed a relationship between participants' dwell times and their tap amplitudes during paired tapping but not solo. Results show that participants mimicked the spatial aspects of each other's movements during simple rhythmic movements.

THE ASSOCIATION BETWEEN WORRY AND VERBAL WORKING MEMORY IN FEMALES CONTROLLING FOR ESTRADIOL

Alexia Davis, Olivia Calvin
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 245
Mentor(s): Jason Moser (PSYCHOLOGY)

Worry, a component of anxiety defined by future-oriented, negative thinking, has been shown to be more prevalent and chronic in females. Worry has been shown to relate to deficits in working memory, a cognitive system required to carry out goal-directed tasks. Additionally, previous research suggests that estradiol relates to working memory in females. However, previous studies relating worry and working memory have not considered sex or ovarian hormones. Thus, we aimed to study how worry and estradiol may interact to predict working memory in females. We studied 114 naturally-cycling females across the menstrual cycle with four in-person visits. On each visit day, subjects completed the Penn State Worry Questionnaire (PSWQ) and provided a saliva sample to be assayed for estradiol. Verbal working memory was measured via the O-Span task, in which the subject tries to remember letters in the order they were presented with interleaved with solving basic math problems, and R-Span task, which interleaves reading comprehension instead of math problems. Our results show that when controlling for average estradiol, average PSWQ scores across the four visits relate to scores on R-span, but not O-span task. Specifically, more chronic worry was associated with lower R-Span scores. Within-person changes in PSWQ scores and estradiol were not associated with performance on either task. Implications of these results will be discussed.

WHAT'S THE BEST WAY TO GET GOOD DATA? COMPARING MOBILE EEG AND HIGH-DENSITY EEG SYSTEMS

Ethan Kosmyna, Morgan Ham, Vishrudh Vasudevan

Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 246
Mentor(s): Amanda Mcgowan (KINESIOLOGY), Matthew Pontifex (KINESIOLOGY)

A noninvasive method for recording the electrical activity of the human brain during mobile activities could have far-reaching benefits for studies of human motor control, brain-computer interface applications, as well as research and treatment of neurological disorders. In recent years, there has been an increase in the number of portable low-cost electroencephalographic (EEG) systems available to researchers that purport high-quality data acquisition using less electrodes and dry recording (i.e., not requiring the gel used in high-density EEG systems). This project will compare the data quality (i.e., signal-to-noise ratio, frequency of dropped samples) between a mobile 8-electrode EEG system that can be used dry or with gel relative to a 64-channel high-density laboratory-based system. Recording conditions for the mobile EEG system will include dry (no gel) and wet (using gel). This data will be compared to data acquired using a laboratory-based EEG system. It is expected that the laboratory system will acquire superior quality, yet the mobile system will provide sufficient data quality using wet recording conditions. These findings will inform the potential utility of such mobile EEG systems for clinical and research purposes.

SEX DIFFERENCES IN CONTEXT-INDUCED REINSTATEMENT OF COCAINE SEEKING USING AN ABBREVIATED PARADIGM

Doris Olekanma

Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 247
Mentor(s): Amy Arguello (PSYCHOLOGY)

Chronic illicit substance use disorders (SUDs) are both an economic and public health issue. One contributing factor to its prevalence is the tendency for recurrent relapse to cocaine use. Epidemiological data suggests that females are more likely to transition from recreational to uncontrolled drug use. Of particular interest, with the growing population of adolescent users, is whether adolescent females are at greater risk for cocaine relapse.
emale, adolescent Sprague Dawley rats (n=12) were trained in an operant self-administration paradigm. Rats were implanted with jugular catheters on postnatal day 33 followed by a recovery period. Rats then underwent two versions of self-administration training, in order to test relapse-like behavior during adolescence (Abbreviated-ABRV) or adulthood (Non-ABRV). Female rats in the ABRV group underwent self-administration (SA) training within a distinct context (two, 2h sessions/day over 5 days), during which lever presses resulted in cocaine infusion. This was followed by extinction training in a contextually unique environment (four, 1h session/day over 2 days), where lever presses resulted in no cocaine infusion. Rats were returned to the initial cocaine-paired context for a 2h reinstatement test (drug-free conditions) during an adolescent timepoint. The Non-ABRV group underwent a similar paradigm with the main difference being an elongated timeline (SA: single , 2h session/day over 10 days; EXT: single, 1h session/day) that allowed reinstatement test to occur during adulthood. To assess the stage of estrous cycle throughout behavioral training, vaginal lavage was taken on a daily basis. Both ABRV and Non-ABRV females displayed stable lever responses by the last three SA sessions and decreased lever responses by the end of EXT training. During the reinstatement test, both groups displayed increased drug-seeking behavior in the previous drug-paired context. Interestingly, a trend for a difference in

drug-seeking behavior was observed between groups that were in estrous vs proestrus phase of the estrous cycle.

REAL-TIME SPELLCHECKING FOR DYNAMIC RECALL EXPERIMENTS

Addison Wood
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 248
Mentor(s): Karl Healey (PSYCHOLOGY)

When performing psychological experiments concerning memory and retrieval, one of the classic methods is to present participants with a series of words and have them recall as many as they can by typing or speaking. One of the critical limitations of this method is the lack of real-time spellchecking. In regards to typed-response experiments, spell-checking is typically done after the experiment is over, where a software checks each typed response. Post-experiment verification limits the possibilities for novel recall studies, such as ones that could adjust the upcoming stimuli in real time based on the correctness of immediately previous responses. To enable this, I made adjustments to a previously made spellchecking script that utilized the Damerau-Levenshtein distance (Damerau, 1964) between participant responses and words in Webster's dictionary. The most significant adjustment was the decision to remove the aspect of the code that checked the response against all 235,886 words in the dictionary, and just checked if the response matched a word in the experiment's word bank. As any particular experiment's word bank is significantly smaller than the Webster's dictionary, the time it takes to spellcheck each word is now significantly faster. This allows for experiments to change in real time based on participant responses, which opens up a multitude of possibilities for recall-based experiments.

HOW DO CISGENDER PEOPLE DEFINE GENDER EXPRESSIONS? THE MEANING OF MASCULINITY, FEMININITY, AND ANDROGYNY

Taylor Anderson
Psychology, Poster Presentation
Section: 3, 11:00 - 12:30 PM
Presentation Number: 249
Mentor(s): Jae Puckett (PSYCHOLOGY)

Beliefs about gender have the potential to perpetuate biases which can lead to questions regarding the social construction and perception of gender categories. To further understand the way gender is defined, we conducted a study evaluating the traits or attributes that cisgender people associate with the gender expressions of masculinity, femininity, and androgyny. Participants included 360 cisgender individuals (63% women, 37% men; M age = 31 years old) who took part in a 15 minute online survey. Participants self-selected into being masculine, feminine, or androgynous. Based on their choice, they then listed characteristics that made them fall into this category. Participants were then asked what would make a person the opposite of their self-selected gender category. Similar terms were grouped and analyzed using Anthropac software to identify central traits. For the masculine category in reference to self, the most common traits were: facial hair, voice, and strength. For the feminine category in reference to self, the most common traits were: hair, makeup, and caring. For the androgynous category in reference to self, the most common traits were: body type, low aggression, no makeup, hairstyle, and clothing choice. When describing others as masculine, participants responded with emotionless, strong, facial hair, and voice. When describing others as feminine, participants commonly referred to the traits of being sensitive, caring, and nurturing. Limitations and implications of these findings will be discussed.

THE EFFECTS OF DOMINANT BEHAVIORS WITHIN SESSION ON PATIENT PSYCHOLOGICAL DISTRESS AND THERAPEUTIC ALLIANCE

Aaron Vergith
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM
Presentation Number: 250
Mentor(s): Alytia Levendosky (PSYCHOLOGY)

The interpersonal relationship between the patient and the therapist, often operationalized as the therapeutic alliance, is common across all types of psychotherapy. Interpersonal theory conceptualizes behavior as occurring along two orthogonal axes of dominance and warmth. Previous studies have found relationships between warm behaviors by the therapist and increased therapeutic alliance and subsequent symptom reduction. However, less in known regarding the role of dominant behaviors of patients and therapists in relation to therapeutic alliance and patient's overall psychological distress. In the current study, we examined how patient and therapist dominant behavior may be related to both therapeutic alliance and patient's overall psychological distress across early to mid-therapy in 24 therapeutic dyads. Using moment-to-moment interpersonal coding, we examined both mean levels and variability of the patient's and therapist's dominant behaviors within sessions. Self-ratings of therapeutic alliance and overall psychological distress were collected from the patient at the 8th and 16th session. The results indicated that variance in patient's dominance at the 5th and 8th session correlated with higher self-reported levels in overall distress and lower levels of therapeutic alliance reported by the patient at both the 8th and 16th session. In addition, higher mean levels of therapist's dominance and higher variance in therapist's dominance were both associated with higher psychological distress and lower therapeutic alliance reported by the patient when examining the same sessions. These results highlight the potential outcomes of dominant behaviors manifested in sessions as a correlate for lower therapeutic alliance and higher levels of patient's overall distress.

IMPROVING PERFORMANCE ON RARE TARGET VISUAL SEARCH TASKS

Amanda Hawkins
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM
Presentation Number: 251
Mentor(s): Mark Becker (PSYCHOLOGY)

Research shows that people perform poorly on visual search tasks when the target is rare. This is a problem for important, real-world searches with low prevalence rates such as radiology, TSA baggage screening, and the detection of underwater mines by the Navy. Given the importance of these tasks, we investigate how to increase target detection in low prevalence search tasks. In this experiment, participants were asked to search for a target, T, among distractor stimuli, L's. Participants performed a control block of low-prevalence (10%) search and a block of one of three experimental conditions. All experimental blocks had the same 10% prevalence rate in the critical trials. The "miniblock" condition also included a short block of 50 trials with a 50% prevalence rate and feedback that was inserted in the middle of the block of critical trials. The "probe" condition distributed the 50 trials from the miniblock throughout the task—so there were occasional target present trials with feedback throughout the block. The "hybrid" condition had probe trials, and poor performance on the probe trials would trigger a miniblock of high prevalence trials. All experimental conditions showed higher target detection rates than the control condition. They also showed slower target absent responses, suggesting that the manipulations increased quitting thresholds and led to more complete searches. Although all three interventions performed similarly, we argue that the probe intervention may be the most practical to implement in real-world circumstances.

FEAR OF CRIME AND RULE BREAKING BEHAVIOR: THE MODERATING ROLE OF RESOURCE AVAILABILITY

Megan McShane, Sarah Gesik, Thomas Zammit
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM
Presentation Number: 252
Mentor(s): Alex Burt (PSYCHOLOGY), Alexandra Vazquez (PSYCHOLOGY)

Extant literature has demonstrated a significant relationship between fear of crime and resource availability in one's neighborhood (Swatt et. al., 2013) as well as between fear of crime and defensive behavior (Will & McGrath, 1995). Low income neighborhoods typically have fewer resources and individuals residing in these neighborhoods often report more fear of crime (Will & McGrath, 1995). Even so, researchers have yet to explore how resource availability and fear of crime may influence one's own engagement in deviant behavior (Hale, 1996; Rader, May, & Goodrum, 2007). This study therefore aimed to address this gap in the literature by exploring the relationship between fear of crime and rule breaking behavior, and the potential moderating role of neighborhood resource availability utilizing a large sample of Caucasian adults (N = 1,645) living throughout Michigan. Analyses conducted on SPSS using OLS regression and Andrew Hayes PROCESS yielded significant results demonstrating that Fear of Crime predicted Rule-breaking behavior ($F= (5, 2048)\ 50.67$, $p < .001$), and that resource availability significantly moderated this relationship ($F (7,1637) = 29.15$, $p<.000$) when controlling for age, sex, education, and duration of time living in the neighborhood. Specifically, the relationship between fear of crime and rule-breaking behavior was significant at low and moderate levels of resource availability, whereas it was not significant at high levels of resource availability. These findings suggest that increasing the provision of resources in high crime areas may be effective in reducing deviant behavior.

DISORDERED EATING

Allie Lapan, Hani Abdelfatah, Kaitlin Ringler
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM
Presentation Number: 253
Mentor(s): Daniel Thaler (PSYCHOLOGY)

Previous research has found that conflict between parents increases a child's risk of developing eating disorders (e.g., anorexia or bulimia). The purpose of this study is to analyze if parental involvement with the child acts as a significant moderator on the relationship between interparental conflict and disordered eating conflict. We expect from this study to find that interparental conflict will be a weaker predictor of children developing eating disorders when the parents are highly involved with them personally, because involvement can provide children with the affection and support they might otherwise miss when there is parental conflict. With a sample of 1,022 twin pairs from Michigan State University Twin Registry, we are measuring self-reported disordered eating using the Minnesota Eating Behavior Survey (MEBS), interparental conflict using the Children's Perception of Interparental Conflict (CPIC) Conflict Properties scale, and parental involvement using the Parental Environment Questionnaire (PEQ) involvement with parent scales.

MOVEMENT VIGOR IN INDIVIDUALS WITH SCHIZOPHRENIA

Zeeba Ali
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM
Presentation Number: 254
Mentor(s): Katharine Thakkar (PSYCHOLOGY)

Negative symptoms of schizophrenia like flat affect and loss of pleasure and motivation impact one's ability to form relationships and function in everyday society. The specific underlying mechanisms are unknown, posing an obstacle for treatment development. Negative symptoms are proposed to reflect a core abnormality in reward processing-specifically, a failure to allocate effort to obtain rewards. Although this deficit has been shown in experimental settings, it is unclear whether it reflects a true reward processing deficit, or a more generalized cognitive deficit, meaning a problem in assigning value to a reward. Another angle for studying reward processing is to look at basic movement parameters—we move more vigorously the more we want a reward. Movement vigor is related to dopaminergic activity and the neural circuitry underlying the vigor of saccadic eye movements and has been outlined in non-human primates. Thus, measuring saccade vigor specifically may provide a precise, quantitative measure of motivated behavior that can be interpreted at the level of physiology and is relatively immune to confounds related to general cognitive functioning. We hypothesized reduced saccade vigor in patients with schizophrenia, particularly those with severe negative symptoms. To investigate this idea, we measured peak velocities and saccade amplitudes of patients and healthy controls during a task where subjects made rapid saccades to visual stimuli. Consistent with our hypothesis, we observed reduced peak velocity, but not saccade amplitude, in patients with schizophrenia. However, no relationship with negative symptoms emerged. These findings may provide insights into mechanisms of schizophrenia.

PRIORITIZATION AND WORKING MEMORY PERFORMANCE

Leah Singman
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM
Presentation Number: 255
Mentor(s): Susan Ravizza (PSYCHOLOGY)

Information in working memory can be prioritized in different ways. Prioritization from physical salience (e.g., a bright color or sudden onset) and goal-driven attention (e.g., voluntary selection of information) are two ways that might lead to differences in the encoding of information into working memory and its maintenance over time. Most models of working memory do not differentiate between these two forms of prioritization but they might lead to differences in recall success. This research's goal is to determine how these two forms affect working memory performance. Our hypothesis is that both physical salience and goal driven attention will result in a greater likelihood of items being encoded into working memory. We also predicted that only goal-driven attention will protect the working memory representation from decay. To test this hypothesis, we conducted a color working memory experiment in which 1 of 4 different colors was prioritized either by goal-driven attention or physical salience. Participants were asked to reproduce the probed color by clicking on a color wheel following encoding. Guess rate (the likelihood that an item did not enter working memory) and precision (the quality of the representation) were estimated using computational modeling. As predicted, both methods of prioritization lowered the guess rate for prioritized items compared to non-prioritized items. Yet only items prioritized through goal-driven attention had higher precision. This research suggests that maintaining information in high resolution depends upon whether items are relevant to the task which likely triggers an effortful process of refreshing the working memory representation.

DO MEN AND WOMEN PROVIDE FEEDBACK DIFFERENTLY? AN EXPERIMENTAL INVESTIGATION.

Emily Martell, Haley Fisk
Psychology, Poster Presentation
Section: 4, 11:00 - 12:30 PM
Presentation Number: 256

Mentor(s): Ann Ryan (PSYCHOLOGY), Danielle Gardner (PSYCHOLOGY)

Given the unique realities between men and women in the workplace, there is much research examining the manner in which women navigate common workplace practices. Considering prior literature on gender differences in communications, we sought to understand if stylistic communication differences are present in feedback scenarios. Therefore, the purpose of the present study was to investigate potential differences in the manner which men and women provide feedback to others, and whether feedback is provided differently depending on the gender of the feedback recipient. To address this notion, we conducted a 2 (Feedback provider gender: male vs. female) X 2 (Feedback recipient gender: male vs. female) between-subjects experiment, in which 215 participants recruited through SONA were tasked with providing written feedback on a peer's writing sample. Results will be presented analyzing the written feedback on metrics such as number of positive words used, number of critical words used, and ratings of feedback delivery positivity, to see if these metrics differ as a function of either provider or recipient gender. The results of this study will provide understanding into how gender may play a role in the context of feedback scenarios commonly present in the workplace.

REGULATORY FIT AND THE PERCEPTION OF POLITICAL MESSAGES

Rebecca Guei
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM
Presentation Number: 429
Mentor(s): J McAuley (PSYCHOLOGY)

Research on political behavior has demonstrated the importance of values and personality traits in voting behavior (Nelson & Garst, 2005; Schoen & Schumann, 2007). This study investigates the role of motivational factors in voters' perception of political messages using a regulatory focus theory framework. Regulator focus theory proposes that people pursue their goals either through a Promotion Focus (eagerly seeking desirable outcomes) or a Prevention Focus (vigilantly avoiding undesirable outcomes) (Higgins, 1997). People experience regulatory fit when their goal-pursuit strategy matches or fits their regulatory focus. Regulatory Fit makes people feel right about their decisions (Higgins, 2000). In this experiment, participants' chronic regulatory focus is assessed and then participants are asked to evaluate (rate) a set of political statements from hypothetical political candidates that covey either a conservative message or a liberal message in different topic categories. Both conservative and liberal messages presented are framed to either fit a promotion focus or a prevention focus. After rating a set of messages, participants are asked to 'vote' for their preferred candidate. Based on a regulatory focus theory hypothesis, participants are predicted to prefer political messages (and vote for the candidate) that are (who is) in a regulatory fit with their chronic regulatory focus. Results will be presented that assess support for the regulatory fit hypothesis.

WELL-BEING AND SOCIAL IDENTITY AMONG WHITE AMERICANS

Nathan Jackson
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM
Presentation Number: 430
Mentor(s): C. David Navarrete (PSYCHOLOGY)

Research in ethnic identity in the U.S. and Europe has largely focused on minority groups living within white-majority societies, finding links between ethnic identity and positive psychological outcomes. As white Americans are in demographic decline, a growing body of research suggests that ethnic identity is becoming more salient to political psychology. Two types of white ethnic identity are noted in the current literature: positive ethnic identity and

white self-consciousness. In the present study of a broad sample of white Americans (MTurk, N = 644), we found significant links among these measures of ethnic identity and well-being, race bias, political orientation, and demographic factors, revealing positive psychological outcomes linked to positive white identity, but not white self-consciousness. Demographic and racial attitude influences were attenuated when entered into a multiple regression.

"FOMO" AND NEGATIVE AFFECT: OVERTLY POSITIVE SOCIAL MEDIA CONTENT & SOCIAL COMPARISON PROCESSES

Katie Lord
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM
Presentation Number: 431
Mentor(s): Mark Becker (PSYCHOLOGY)

Social media applications such as Instagram, Facebook, and Snapchat have been suggested to cause "FOMO" (Fear of Missing Out). FOMO has been defined as "a pervasive apprehension that others might be having rewarding experiences from which one is absent… FOMO is characterized by the desire to stay continually connected with what others are doing," (Przybylski, Murayama, DeHaan, & Gladwell, 2013). Often this desire to stay connected to our peers via social media may exacerbate, rather than alleviate, negative feelings associated with FOMO. It has been hypothesized that this relationship exists as many satisfy the drive to stay connected by accessing social media platforms. Subsequently, social media users are often subject to view exclusively positive content detailing the highlights of their friends, families, and peers' lives that is typical to social media pages. This results in the production of fallacious assumptions about the relative excitement, happiness, and success of one's peers. Furthermore, it has been suggested that the drive to stay connected may reinforce one's belief that they are missing out on rewarding experiences because the social media platforms they check present an artificially positive view of what others' lives are like. Thus, exposure to overtly Positive Social Media Content (PSMC) may facilitate social comparison processes and generate distress and negative affect as indicated by the Positive and Negative Affect Schedule, or the PANAS, and emotional attentional biases on a dot-probe task.

CAN LISTENERS MATCH STORIES GENERATED IN RESPONSE TO MUSIC TO THE MUSICAL EXCERPT?

Anusha Mamidipaka, Gabby Kindig, Jewelian Fairchild
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM
Presentation Number: 432
Mentor(s): J McAuley (PSYCHOLOGY)

A recent study compared stories that listeners from the US and a remote village in China imagined in response to wordless Western and Chinese music (Margulis, Wong, Simchy-Gross & McAuley, 2019). Imagined stories for each musical excerpt demonstrated a within-culture similarity, often containing common underlying themes, and a between-culture divergence, differing in theme and subject matter. This tendency to have culturally-specific narrative responses to music can be attributed to enculturation, an individual's gradual adaptation to cultural characteristics through exposure. The present study investigates whether people can correctly match consensus stories, which were generated previously in the Margulis et al. study, with the musical excerpt that generated the response. Listeners in the US and a remote village in China heard a subset of Western and Chinese musical excerpts that generated the most similar content across US participants. For each excerpt, listeners were then presented with two stories. One story was the 'correct' story (imagined by a participant in response to the excerpt) and the other was a foil (one of the 'correct' stories imagined in response to a

different excerpt). Remarkably, participants from the US correctly matched the stories to both types of excerpts with over 90% accuracy. However, participants from the village in China who had little to no exposure to Western culture performed the task at only 50% accuracy. Overall, certain excerpts seem to communicate specific stories to listeners within a culture, but not across cultures, providing further evidence of the role of enculturation in narrative perceptions of music.

PROVIDERS' CONFIDENCE IN PARENT-MEDIATED INTERVENTION SKILLS FOR YOUTH WITH AUTISM SPECTRUM DISORDER: DIFFERENCES ACROSS TREATMENT SETTINGS

Katherine Fedurek
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM
Presentation Number: 433
Mentor(s): Brooke Ingersoll (PSYCHOLOGY), Diondra Straiton (PSYCHOLOGY)

Autism Spectrum Disorder (ASD) is a developmental condition that impacts an individual's social communication skills and is associated with restrictive and repetitive behaviors (American Psychiatric Association, 2013). One important treatment approach for ASD is Applied Behavior Analysis (ABA), which uses operant conditioning to teach everyday life skills to those affected by ASD (Matson, Hattier, Belva, 2012). Parent-mediated intervention, an evidence-based ABA treatment for ASD, trains parents and providers to foster change in their children's behavior and improves child outcomes (Bearss et al., 2015). However, little is known about ABA providers' confidence in their ability to use parent-mediated intervention with their clients who have ASD. This project examines a) whether ABA providers across different treatment settings differ from each other in how confident they are in their parent-mediated intervention skills and b) whether confidence in these skills uniquely predicts the extensiveness of providers' use of parent-mediated intervention.Descriptive statistics, an ANOVA, and hierarchical linear regression were used to analyze ABA providers' responses, from across the United States, on a questionnaire (N=1,089). This presentation will demonstrate which settings are implementing parent-mediated intervention infrequently and will examine the role that setting plays in predicting the extensiveness of providers' use of parent-mediated intervention. Results will identify where public health efforts are best focused to increase parent training use.

HOW DO ORGANIZATIONAL CUES INFLUENCE APPLICANT PERCEPTIONS: IDENTITY SAFETY OR FIT?

Justin Duby
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM
Presentation Number: 434
Mentor(s): Ann Ryan (PSYCHOLOGY)

Recruitment strategies of organizations have used technological advances in order to appeal to a larger and more representative applicant pool. Unfortunately, the use of organizational websites may be emitting cues that signal identity threat to potential applicants from marginalized groups. Previous research on identity cues in the recruitment context demonstrates that pictorial diversity stimuli on organizational websites result in marginalized group members viewing the organization as more attractive (Avery, 2003). In an earlier study, it was discovered that increasing the number of diversity resources presented to applicants did not correlate with an increase in these mechanisms. Organizations that expressed a growth mindset correlated with a greater perception of both identity safety and person-organization fit. The current study identifies two concepts of identity safety and person-organization fit in which such identity cues influence minority perceptions of organizations. Through the examination of numerous fortune 500 companies' organizational

websites, the mindset, pictorial cues, and diversity resources were measured and analyzed. It is hypothesized that organizations that present a growth mindset along with company created diversity resources on diversity webpages will attract more diverse applicants who will perceive the organizations as more inclusive and attractive. It is also hypothesized that companies that present more diverse pictures on their websites will be perceived as more inclusive and positively correlate with identity safety and person-organization fit. This research will draw attention to novel cues that influence marginalized applicants' perceptions of organizations to create an inclusive workplace.

CHILDCARE VS ELDERCARE: ACCOMMODATION PERCEPTIONS OF COWORKERS

Justin Duby
Psychology, Poster Presentation
Section: 5, 1:00 - 2:30 PM
Presentation Number: 435
Mentor(s): Ann Ryan (PSYCHOLOGY)

Workplace accommodations grant individuals the ability to favorably engage in employment through a time of need or assisted aid. Although such accommodations are provided to organizational staff who present an issue that would hinder their function in the workforce, coworkers may perceive certain accommodations as unfair due to the fact that they are given to individuals in situations to which their associates do not belong. This notion of perceived unjust reasoning of accommodations among coworkers has direct impact on the entire accommodation procedure. Previous studies show that accommodations given due to family caregiving purposes are perceived as the least fair when compared to accommodations given for religious or disability reasons. There are limited studies focusing on eldercare and none observe the difference in accommodation perceptions between caregivers of children and the elderly. The current study aims to specifically analyze coworker perceptions of accommodations provided for childcare versus eldercare purposes. 200 participants will be presented a scenario in which they are to imagine their coworker is requesting accommodation for one Friday off every month either due to childcare or eldercare responsibilities depending on the participant's given experimental condition. Primarily, the perceived fairness of the accommodation will be measured along with the perceived necessity, reasonability, and deserving of the accommodation. It is hypothesized that accommodations given for childcare reasons will be perceived by coworkers as fairer and more uncontrollable than accommodation given for eldercare reasons. This project will spread awareness of workplace needs regarding both types of accommodation.

ENACTED STRESSORS AND SUBSTANCE USE IN TRANSGENDER AND GENDER DIVERSE INDIVIDUALS

Aislinn Langley
Psychology, Poster Presentation
Section: 6, 1:00 - 2:30 PM
Presentation Number: 436
Mentor(s): Jae Puckett (PSYCHOLOGY), Kaston Anderson-Carpenter (PSYCHOLOGY)

Transgender and gender diverse (TGD) individuals have been shown to experience discrimination, harassment, and violence related to bias against their gender identity that can negatively affect their mental health. TGD people also experience various negative health outcomes at higher rates than the general population. One of these negative health outcomes is high rates of substance use. Drawing on Meyer's (2003) minority stress theory, researchers have posited that the motivation for substance use in TGD individuals might be to help them cope with the enacted and proximal stressors they experience. In this study, I investigated the relationships between experiences of enacted stressors and substance use in a TGD sample. Of the 181 participants, 37% were categorized as at risk for alcohol use disorders and 36.7%

were categorized as at risk for substance use disorders. There were weak positive correlations between enacted stressors and substance use for both alcohol use and drug use measures. A few items from the stigma measure also individually correlated with alcohol and/or substance use. However, there was no significant difference in stigma scores between the individuals in the groups deemed to have no risk for alcohol use disorders/substance use disorders compared to those in the groups with some risk or higher. The nature of the relationship between enacted stressors and substance use in TGD individuals remains unclear, but since TGD people experience unique stressors and high substance use rates, it remains an important relationship to investigate.

ABNORMAL PUPIL LIGHT REFLEX RELATES TO NEGATIVE SYMPTOM SEVERITY IN SCHIZOPHRENIA

Jessica Fattal
Psychology, Poster Presentation
Section: 6, 1:00 - 2:30 PM
Presentation Number: 437
Mentor(s): Katharine Thakkar (PSYCHOLOGY)

The psychophysiology of the negative symptoms of schizophrenia has been largely misunderstood due to the inaccessibility of the underlying circuitry, however more recent studies have found pupillary changes useful as an indicator of cholinergic and noradrenergic activity, granting an opportunity to observe these mechanisms noninvasively. Individuals with schizophrenia have shown reduced pupillary dilation during cognitively demanding tasks, which is related to anhedonia and has been interpreted as reflecting inappropriate effort allocation and reduced informational processing capabilities. Older studies have shown abnormalities in the pupil light reflex in individuals with schizophrenia; however is it unknown whether these abnormalities are related to negative symptoms. We sought to explore this in the current study. To conduct this experiment, we used a hand-held pupillometer to measure pupillary diameter over a five second window during which light was flashed for one second in participants with schizophrenia (SZP) and in demographically-matched healthy controls (HC). To investigate whether putative deficits were specific to schizophrenia, we also included individuals with, bipolar disorder (BP). Dynamics of pupil constriction and subsequent dilation were compared between groups and correlated with scores on the Scale for the Assessment of Positive Symptoms (SAPS) and the subscales of the Scale for the Assessment of Negative Symptoms (SANS). SZP and BP had altered pupillary light reactions compared to HC, and these reactions were correlated with negative symptoms. Given that pupil dynamics may provide a window into neuromodulatory function, these findings may shed light on the mechanisms of clinical symptoms, with implications for treatment development.

FEAR OF CRIME AND NEGATIVE EMOTIONS: THE ROLE OF SEX AND SOCIAL COHESION

Heather Asuncion, Kennedy Franklin, Luke Noah, Zach Kostelec
Psychology, Poster Presentation
Section: 6, 1:00 - 2:30 PM
Presentation Number: 438
Mentor(s): Alex Burt (PSYCHOLOGY)

Disadvantaged neighborhoods predict a number of deleterious outcomes, including reduced levels of well-being. However, few studies have examined the social processes within the neighborhood and how they might differentially impact the negative emotions of residents. This is surprising considering the tremendous impact negative emotions can have on our physical and mental well-being, and the care we put into cultivating our social circles. We hypothesize that residents in neighborhoods with higher levels of social cohesion (social connectivity with neighbors) will experience lower levels of negative emotion due to fear of

crime, compared to residents in less socially cohesive neighborhoods. Also, public safety records suggest that women usually report higher levels of fear of crime than men, possibly driven by fear of sexual assault. Therefore, we hypothesize that fear of crime will be positively associated with negative emotion; and that this association will be larger for women compared to men. Participants will be from a neighborhood informant sample (N=2203) of majority white, educated residents, with a household income of around $40,000. To test our hypotheses, we will use a linear regression model to examine associates between fear of crime and negative emotions, while testing for the moderating effects of sex and social cohesion. These results should inform our understanding of the differential impacts of the fear of crime for men and women and the potential of social cohesion to buffer the negative emotions associated with fear of crime.

THE EFFECT OF PSYCHOLOGICAL IPV ON HEALTH BEHAVIORS AND PRENATAL CARE UTILIZATION

Paula Guzman
Psychology, Poster Presentation
Section: 6, 1:00 - 2:30 PM
Presentation Number: 439
Mentor(s): Alytia Levendosky (PSYCHOLOGY)

Intimate Partner Violence is known to have significant negative effects on both mental and physical health. Those who endorse IPV are at an elevated risk for injury, having severe mental health outcomes, and various other negative health outcomes. Importantly, IPV during pregnancy further escalates the risk of harm for not only the mother, but also the unborn child. Unfortunately, these women often report experiencing an increase in violence during pregnancy. Women experiencing IPV during pregnancy have greater risk for complications during pregnancy and birth, as well as receiving inadequate or late prenatal care. While IPV research has grown in past few decades, the unique impact of psychological IPV is frequently overlooked. This study aims to understand the differential effects of psychological IPV, independent from physical and sexual IPV, on prenatal health behaviors and the utilization of prenatal care. Specifically, I will examine three possible pathways through which psychological IPV may affect women's prenatal care and health behaviors during pregnancy, including direct effects, and indirect effects through maternal health and substance use. Participants consist of 335 women between 15 and 20 weeks pregnant. The analysis will include hierarchical linear regression models to test each of the three pathways, and income, ethnicity, education and parity will be controlled. Implications from this research include policy changes to assess pregnant women for psychological IPV, as well as other forms of IPV, and fine-tuning interventions for pregnant women experiencing psychological IPV.

WHY DO I REMEMBER THAT? SLEEP STRENGTHENS MEMORIES FOR INFORMATION THAT WAS NOT INTENTIONALLY REMEMBERED

Abdulrahman Alharthi, Erin Sawyer, Kaylie Williams
Psychology, Poster Presentation
Section: 6, 1:00 - 2:30 PM
Presentation Number: 440
Mentor(s): Kimberly Fenn (PSYCHOLOGY)

Humans encounter an enormous amount of information each day; some is actively remembered whereas some is remembered unintentionally. Previously, we found that sleep consolidated incidentally encoded memories, or unintentionally remembered memories, and that consolidation may depend on memory strength. Here, we investigated the effect of sleep on strong and weak memories after incidental encoding. In Experiment 1, participants completed either a deep or shallow encoding task in which they rated words on abstractness (deep), or number of vowels (shallow) either one or three times. They also completed a

surprise recognition memory test after a 12-hour retention interval composed of wake or sleep. Wake participants completed the encoding task in the morning and the test in the evening; Sleep participants completed encoding at night and the test the following morning. We found a main effect of condition such that Sleep participants had better memory for words than Wake, following only deep encoding, regardless of the number of encoding trials (one or three). In Experiment 2, all participants encoded words in the evening, received an 8-hour sleep opportunity with partial polysomnography to objectively assess sleep, and completed the test in the morning. This experiment is ongoing, but we predict there will be a positive correlation between the amount of time participants spend in SWS and memory performance for words encoded both one and three times. This work has implications for study strategies for college students and suggest that balancing sleep with study time may optimize performance.

EXTRACURRICULAR ACTIVITIES, STRESS, AND BURNOUT

Jackie Kosmas
Psychology, Poster Presentation
Section: 6, 1:00 - 2:30 PM
Presentation Number: 441
Mentor(s): Jonathan Weaver (PSYCHOLOGY)

Extracurricular activities have historically been used as a break from academic tasks. Previous research has investigated the correlation of extracurricular involvement, stress, and burnout mitigation in the college student population. However, findings have shown inconsistent results. Some research states that no significant correlation exists. Specifically, that extracurricular activities are neither positively nor negatively correlated to stress and burnout; and therefore, extracurricular activities do not act as a protective variable. On the other hand, some research demonstrates the protective value of extracurricular activities. Specifically, that a significant negative correlation exists between extracurricular activities and stress. University students will be recruited to participate in the current research. They will complete a series of psychological measures aimed at gathering information about extracurricular involvement, academic obligations, and perceived stress and burnout levels. It is hypothesized that a negative correlation between extracurricular involvement, stress, and burnout will be found. Or, that by participating in extracurricular activities, a person will experience lower stress and burnout levels. The findings will identify the importance of academic breaks. Furthermore, it will encourage future research on the specific types of extracurricular activities that best decrease stress and burnout.

THE USE OF CHILDREN TO CONTROL AND MANIPULATE DOMESTIC VIOLENCE SURVIVORS SEEKING SERVICES

Mackenzie Sprecher
Psychology, Poster Presentation
Section: 6, 1:00 - 2:30 PM
Presentation Number: 442
Mentor(s): Cris Sullivan (PSYCHOLOGY), Kathryn Clements (PSYCHOLOGY)

Domestic violence survivors are often subject to multiple methods of power maintenance and control or manipulation by their abusers, including the manipulation of their children (Fogarty et al., 2019). Abusers may threaten to take children from the mother, use children as sources of information, or use prolonged custody battles or visitation as a way of tracking the victim (Beeble, Bybee, & Sullivan, 2007). This study expands understanding of abusers' use of children as a tactic of control among a large sample of survivors of domestic violence who had recently sought services from domestic violence advocacy organizations. 407 survivors were interviewed as part of an evaluation of the Domestic Violence Housing First program in Washington state. 300 survivors had children and responded to seven items about the

abuser's attempts to use the children as a form of manipulation (Beeble, Bybee, & Sullivan, 2007). 277 survivors with children (92%) reported their children had been used as a tactic against them in their lifetime, and 265 (88%) had experienced this in the past six months. Additional contextual variables related to the relationship with the abuser will be explored. Preliminary results are consistent with previous research that the use of children by abusers to maintain control over current and former partners is common. Almost all survivors interviewed had experienced this at some time. Findings suggest that scholars and practitioners would benefit from exploring this area more to understand the complexities of survivors' experiences.

ASSOCIATIONS BETWEEN ESTRADIOL LEVELS, PHYSICAL DEVELOPMENT, AND DISORDERED EATING SYMPTOMS DURING PUBERTY IN GIRLS

Shruthi Ilango
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM
Presentation Number: 623
Mentor(s): Kelly Klump (PSYCHOLOGY), Natasha Fowler (PSYCHOLOGY)

Disordered eating (DE) symptoms (e.g., weight preoccupation, binge eating) are rare in pre-puberty but markedly increase across pubertal development in girls. Past research has focused primarily on psychosocial factors contributing to this pubertal emergence, including the physical changes of puberty (e.g., increases in adiposity) and their impact on body dissatisfaction and mood. However, emerging data suggest that the hormones that are activated during puberty in girls (e.g., estrogen) may also play a role in increased DE risk. The purpose of the current study was to examine the independent and interactive effects of the physical and hormonal changes of puberty on risk for DE in girls. Participants will include 1,001 girls ages 8-16 years from the Michigan State University Twin Registry who completed one-time assessments of pubertal development (assessed via the Pubertal Development Scale), DE behaviors (i.e., total levels of DE as well as binge eating, body dissatisfaction, weight preoccupation; assessed via the Minnesota Eating Behavior Survey), and salivary estradiol levels. Analyses are on-going, but it is expected that interactions between pubertal physical development and estradiol levels will significantly predict DE symptoms. This work is expected to provide valuable insight into the relationship between ovarian hormones and physical maturation during puberty in order to better identify which girls may be at an increased risk for developing DE during puberty and beyond.

THE EFFECTS OF OBSERVED EFFECT ON PARTICIPANT'S PERFORMANCE INFERENCES, FELT MOOD, AND SUBSEQUENT SURFACE ACTING: A NEGOTIATION SIMULATION STUDY

Ireland Papa, Prachee Pingle, Sarah Sitto
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM
Presentation Number: 624
Mentor(s): Sergio Marquez (FAMILY MEDICINE)

Emotions provide insight to an individual's intentions, motivations, and needs. In a work setting, employees observe emotional displays (i.e., affect) from customers, coworkers, and their bosses, which subsequently shape both their job performance and own felt affect. Employees are then expected to control their emotional and affective responses in accordance to these observed emotion displays and to the overarching emotion display norms of a situation. This process is referred to as emotion regulation. Surface acting is a notable emotion regulation strategy and involved suppression of one's actual emotions to conform to a situation's expected emotion display norms. While the relationship between actor's emotion display and a target's emotion regulation has been extensively studied in

organizational settings, research concerning the mechanisms linking this relationship is meager. To investigate this, participants were instructed to conform to positive affect display norms and then we manipulated simulated opponent's emotion displays during an online negotiation scenario to capture effects on participant's perceived felt mood (happy/angry) and performance inferences. We hypothesize that participants' surface acting will be predicted by performance inferences when they perceive their opponent as angry and that surface acting will not be predicted by their felt affect when their opponent is happy. Study findings have implications for understanding the process of emotion regulation, and for workplace settings that require frequent emotion regulation for employees.

PARENT-CHILD COMPLEMENTARITY: PREDICTING RELATIONSHIP OUTCOMES THROUGH INTERPERSONAL BEHAVIOR

Miranda Matern
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM
Presentation Number: 625
Mentor(s): Alex Burt (PSYCHOLOGY), Alytia Levendosky (PSYCHOLOGY)

Interpersonal Theory asserts that during interactions between two people, each individual influences the behavior of the other. In these transactions, the principle of complementarity highlights the fact that an individual's warmth (or dominance) will either heighten or constrain that of their co-member. What's more, complementarity has been shown to have important implications for relationship quality. The current study sought to extend this work, evaluating moment-by-moment joystick tracking of parent-child interactions to identify complementarity in both the mother-child and the father-child relationships. The 1,030 twin families included in this study participated in a cooperative Etch-a-Sketch task, allowing for the observation of warmth and dominance twice a second by trained coders. The Parental Environment Questionnaire was administered to both parents and children to assess key aspects of the parent-child relationship quality, including parent-child conflict and parental involvement with child. Results illustrated high levels of both warmth and dominance complementarity in both mother-child and father-child relationships, with fathers showing slightly larger mean levels of complementarity than mothers. Greater warmth complementarity with either mothers or fathers predicted reduced conflict in the dyad. Lower dyad conflict ratings were also associated with greater dominance complementarity in the mother-child relationship, but not in the father-child relationship. No significant associations were found with parental involvement with child. Implications are discussed.

#METOO: FAIRNESS IN WORKPLACE INVESTIGATIONS OF HARASSMENT

Addie Nelson
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM
Presentation Number: 626
Mentor(s): Ann Ryan (PSYCHOLOGY), Danielle Gardner (PSYCHOLOGY)

Due to the widespread prominence of the #MeToo and Time's Up movements, sexual harassment has become a popular topic among the public. However, the degree to which sexual harassment is systematically and effectively investigated within organizations has received much less attention. For this reason, the present study intends to shed light on workplace investigations of sexual harassment, through the examination of various aspects that may inform whether investigations are perceived as fair in nature. To investigate this notion, we will conduct a 2 (Investigation focus: confidentiality vs. transparency) X 3 (Investigation role: complaining party vs. responding party vs. witness) between-subjects factorial design to understand how these factors relate to three justice perceptions: informational justice, procedural justice, and interpersonal justice. A sample of 300 adults

employed at least part-time will be recruited from Amazon's Mechanical Turk system to complete our online scenario study. Specifically, participants will be instructed to imagine themselves within a workplace sexual harassment investigation as described within a provided scenario; however, the content of the presented scenario will differ depending on the participants' experimental condition. We hypothesize that justice perceptions will differ depending on investigation focus and participants' imagined role within the investigation. The results of this study will give insight as to how people are experiencing sexual harassment investigations in the workplace and what they value in these investigations.

LINKING OBSERVED EMOTION DISPLAYS TO SUBSEQUENT DEEP ACTING: THE ROLES OF FELT AFFECT AND PERFORMANCE INFERENCES

Emily Watson, Olivia Berutti, Sean Hartley
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM
Presentation Number: 627
Mentor(s): Sergio Marquez (FAMILY MEDICINE)

Emotions provide insight to an individual's intentions, motivations, and needs. In a work setting, employees observe emotional displays (i.e., affect) of customers, coworkers, or bosses, which subsequently shape both their job performance and felt affect. Employees then must control their emotional and affective response in accordance to a target's observed emotion displays and to the overarching emotion display norms of a situation. This process is known as emotion regulation. One notable emotion regulation strategy is known as deep acting—manipulating one's internally felt emotions to better match the norms and expected response to another's affect. The relationship between a target's affect and deep acting is established, however, there is no discussion of the mechanisms linking this relationship. The purpose of this study was to investigate how and when individuals engage in deep acting, either by leveraging their emotional responses or relying on inferences about their performance. To test this, an experimental design was utilized featuring simulated negotiation scenario where opponent's emotion display was manipulated (angry vs. happy) and participants were instructed to display positive emotions. We hypothesize that participants' deep acting will be predicted by their felt emotions when they perceive their opponent as happy and that deep acting will be predicted by performance inferences when their opponent is angry. Study findings have implications for understanding the process and nature of emotion regulation, and for workplace settings that require frequent emotion regulation between employees and customers.

EYE-TRACKING EVIDENCE FOR CATEGORICAL GUIDANCE OF VISUAL SEARCH

Erynne Dixon, Sandeep Rajasekaramoorthy, Syaza Karzaman
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM
Presentation Number: 628
Mentor(s): Mark Becker (PSYCHOLOGY)

In visual search, cues about the identity of a target help guide attention. Here we investigated whether the mental representation of the target is visual, categorical, or both. After being primed to which bar orientation the target would appear on, participants searched among 24 oriented bars for a small, downward facing gap. Within the display, there were six bars of four different orientations [MB1] (-67.5, -22.5, 22.5, 67.5 degrees from vertical). Although there were four orientations, two (-22.5 and 22.5) appeared "steep" and two (-67.5, 67.5) appeared "shallow". Eye-tracking data showed a modest constrain of attention to the cued orientation, but also a strong bias to fixate on unqueued bars of the same category (steep/shallow), suggesting that observers used a categorical rather than visually based cue. However, it is possible that observers used a viewpoint independent visual-based cue—with these mirrored

stimuli, a steep left bar is the same as a steep right bar from the opposite viewpoint. To distinguish between these two interpretations, a second experiment was administered where all orientations were rotated 7 degrees clockwise (e.g., -60.5, -15.5, 29.5, 74.5). This resulted in two "steep" and two "shallow" cues but eliminated the viewpoint invariant doppelgangers. Again, the cued orientation was fixated most often, and there was still a strong bias to look at the distractor of the same category as the cued orientation. These data suggest that both visually based and categorically based representations influence the guidance of visual attention.

ROLE OF NEUROTICISM ON THE RELATIONSHIP BETWEEN EMPATHY AND CYBERBULLYING

Anushka Patel, Brandi Randall, Nidhi Dungrani, Niyanka Shah
Psychology, Poster Presentation
Section: 7, 3:00 - 4:30 PM
Presentation Number: 629
Mentor(s): Alex Burt (PSYCHOLOGY), Mikayla Kim (PSYCHOLOGY)

Cyberbullying, or online interpersonal cruelty, is an emerging public health crisis. Not surprisingly, the perpetration of cyberbullying has been correlated with lower levels of empathy. Empathy is generally defined as one's ability to understand or feel another person's perceptions or emotions. Because individuals with low levels of empathy have a difficult time recognizing negative emotions expressed in others, the likelihood of perpetration is increased. In addition, cyberbullying has also been correlated with higher levels of neuroticism. Neuroticism, one of the well-known Big Five personality traits, describes individuals who are more likely to experience feelings such as anger, anxiety, and frustration. It is not yet clear, however, if and how neuroticism affects the relationship between empathy and cyberbullying. Our study sought to address this question by evaluating the moderating role of neuroticism on this association in a large sample of undergraduate students (N = 850). Based on previous findings for other forms of aggression, we predict that low empathy will increase cyberbullying more in those prone to negative emotions.

GENDER DIFFERENCES IN SOCIAL AGGRESSION: POTENTIAL DIFFERENTIAL ROLES OF NEUROTICISM AND IMPULSIVITY

Bella Andrus, Cody Mohr, Shree Mysore
Psychology, Poster Presentation
Section: 8, 3:00 - 4:30 PM
Presentation Number: 630
Mentor(s): Alex Burt (PSYCHOLOGY), Mikayla Kim (PSYCHOLOGY)

Social aggression is a form of antisocial behavior that uses social relationships to damage and inflict harm on others. These behaviors include gossiping, spreading rumors, and ostracism. Social aggression has historically been conceptualized as being more common in females, but recent work suggests that it is equally prevalent in males and females. This absence of gender differences is noteworthy, both because it runs counter to early assumptions about social aggression, but also because many of the predictors of social aggression vary rather considerably by gender. As one key example, neuroticism and impulsivity both increase risk for social aggression, and do so despite the fact that neuroticism is usually higher in females whereas impulsivity is usually higher in males. Our study sought to better understand this conundrum, evaluating the moderating role of gender on the relationships of impulsivity and neuroticism with social aggression in a large sample of undergraduate students (N = 850). We predict that neuroticism would be especially predictive of social aggression in females while impulsivity would be especially predictive in males. Such findings would suggest that, although social aggression is equally common in males and females, it has different psychological origins in each gender.

ALTERING STUDY SCHEDULES TO MAXIMIZE RECALL

Ryan Riger
Psychology, Poster Presentation
Section: 8, 3:00 - 4:30 PM
Presentation Number: 631
Mentor(s): Kimberly Fenn (PSYCHOLOGY), Susan Ravizza (PSYCHOLOGY)

Learning new material benefits from spacing study sessions over multiple days, a phenomenon known as the spacing effect. Spaced practice schedules, however, do not work if the gap between study sessions is too large. This implies that there is an optimal interval for spacing between sessions, and this experiment was designed to investigate factors that may influence the optimal length. Participants completed two study sessions and one test session, learning a paired associates list, and were divided into four groups based on interstudy interval (length of time between the first two study sessions (ISI)) and retention interval (length between the second study session and the test session (RI)) length: a 3/3 group, a 3/7 group, a 7/3 group and a 7/7 group. If the spacing effect is a function of absolute length of time between practice sessions, the 3/3 ISI/RI group should perform the best because it has the shortest time interval between sessions, minimizing memory decay. Alternatively, if the temporal expectation hypothesis, which predicts that a recognizable pattern of intervals would maximize recall, is true, then the 3/3 and 7/7 groups might both perform the best. This study will help us discover how to optimize practice schedules to improve learning across many settings.

SLACKTIVISM STUDY: FACTORS THAT AFFECT PEOPLE'S CHOICE WHETHER TO INTERVENE IN WORKPLACE DISCRIMINATION

Justin Duby, Lauren Collier, Vivian Dai
Psychology, Poster Presentation
Section: 8, 3:00 - 4:30 PM
Presentation Number: 632
Mentor(s): Ann Ryan (PSYCHOLOGY)

People who self-identify as allies of marginalized group members may not always intervene on behalf of the members when witnessing discrimination in the workplace. The bystander intervention theory (Darley & Latané, 1970) and confronting prejudiced responses model (Ashburn-Nardo, Morris, & Goodwin, 2008) have implications for this phenomenon. The aim of the present study is to understand this "slacktivism" phenomenon and examine the factors that affect whether or not a person intervenes when witnessing subtle discriminatory acts. To that end, White participants responded to several workplace scenarios, developed grounded in Cortina's workplace incivility measure but edited to be more content valid for our research purpose, in which a Black man was subtly discriminated against by a White actor. They were asked whether or not they would intervene and asked the reasons for the decision provided. In addition, we collected the data concerning several theoretically related individual differences from the participants. The dimensions are social dominance orientation, political orientation, empathy, goal orientation, and personality. We hypothesize that these personality variables would have an impact on the decisions made by the participants. This research will be helpful to encourage these potential allies to act under a discriminatory situation and further promote workplace diversity and inclusion.

HOW LONG IS TOO LONG: THE POTENTIAL LINK BETWEEN INCREASED INCARCERATION TIME, JOB SEARCH MOTIVATION, AND RECIDIVISM

Madison Pride
Psychology, Poster Presentation
Section: 8, 3:00 - 4:30 PM

Presentation Number: 633
Mentor(s): Merry Morash (CRIMINAL JUSTICE)

As a result of the "tough on crime" era, prison populations in the United States have grown drastically alongside sentence length which has seen an unprecedented increase. Literature examining the effects of "prisonization" (the negative psychological effects of incarceration), suggested that longer periods of imprisonment further diminished pro-social attitudes among inmates. In this study, I examined the relationship between the length of time one was exposed to "prisonization" and offender motivation to search or not to search for a job. Self-Determination Theory (SDT) was used to evaluate autonomous (internal), controlled (external), and amotivation for searching. Autonomous and controlled motivation for not searching were also evaluated. To collect relevant data, the Job Search Self-Regulation Questionnaire (SRQ-JS) was administered to a sample of male inmates incarcerated in the Michigan Department of Corrections. Previous research utilizing the SRQ-JS has determined that autonomous job search motivation is the only positive correlate of job search behavior. I hypothesized that autonomous job search motivation would be negatively correlated with length of incarceration. Additional research suggested that former inmates who secured gainful employment after institutional release were less likely to recidivate. Therefore, this work could have important implications regarding alternative sentencing options for non-violent criminal offenders and a review of the usefulness of mandatory minimum sentencing laws.

THE DISCONNECT: MEN'S ATTITUDES AND PERCEPTIONS OF SEXUAL VIOLENCE

Katerina Levy
Psychology, Poster Presentation
Section: 8, 3:00 - 4:30 PM
Presentation Number: 634
Mentor(s): Jonathan Weaver (PSYCHOLOGY)

Relationship violence and sexual misconduct is a pervasive problem on many university campuses. Prior research indicates that there is a disconnect between defining and understanding what constitutes rape behaviors. It remains unclear why behaviors that are consistent with sexual aggression, coercion, and force are perceived as distinct from calling an act rape. This study aims to investigate this disconnect in order to further inform campus prevention programming. Three-hundred male participants between the ages of 18-35 will be recruited via the Qualtrics Panel Survey. Both groups will complete a series of psychological measures aimed at gathering information on sexual attitudes, rape myths, and attitudes towards women. Additionally, the Unmatched Count Technique will be utilized where each participant will be randomly assigned to one of two groups for the study. One group will see a list of innocuous statements and indicate how many statements are true descriptors of them. The other group will see the same list, but also a positive affirmation statement about forced sexual acts. It is hypothesized that participants will be more likely to endorse statements about sexual aggression presented within the Unmatched Count Technique measure compared to the other scales as a result of its aim to retrieve sincere answers to sensitive questions. This work has the potential to increase understanding of how rape is perceived and understood by others. Knowledge gained from this research can assist in developing prevention programs tailored to dispute rape myths, misunderstandings, and false conceptions about the behaviors that constitute a rape.

HAVE POLICE SHOOTINGS LED TO A "FERGUSON EFFECT" IN THE U.S.: A COMPREHENSIVE TEST OF THE EVIDENCE

Pero Dagbovie
Psychology, Poster Presentation
Section: 8, 3:00 - 4:30 PM

Presentation Number: 635
Mentor(s): Joseph Cesario (PSYCHOLOGY)

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).

SOCIAL SCIENCES

SOCIOCULTURAL AND INSTITUTIONAL FACTORS INFLUENCING ADOPTION OF FAMILY PLANNING METHODS: PERSPECTIVES FROM A RURAL FARMING COMMUNITY IN BURUNDI.

Don Iradukunda
Social Sciences: General, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 171
Mentor(s): Felix Yeboah (INTERNATIONAL STUDIES & PROGRAMS)

High fertility rates remain a key threat to sustainable economic development in most African countries, and particularly in countries with fragile and young political institutions like Burundi. As part of efforts to address this demographical social challenge, multiple programs have been initiated at the national level, and the most popular one is the use of family planning methods. Although this program has been existing for more than 15 years, the population growth rate remains high, estimated at 3.4% in 2018. Using data from in-depth qualitative interviews and a household survey, this study examines the socio-cultural and institutional factors influencing the adoption of contraceptive methods among females in Rumonge, Province of Burundi. Specifically, it explores some of the use-rates, perceptions, preferences, and religious beliefs on various family planning methods and offers useful insights for designing effective, culturally-relevant health promotion campaigns. Results revealed that respondents generally lack knowledge on the array of contraceptive methods available to them, the side effects of these methods and the risk associated with unprotected sex. Perceived cultural and religious norms around intimacy between couples, lack of female control over their fertility decisions, and misperceptions of the negative impacts of contraceptives significantly influenced female's choice and/or the lack thereof of family planning methods. This research examines the necessary tools that promote reproductive health in Burundi.

LOCAL EATS: MAPPING THE SPATIAL DISPERSION OF GREAT LAKES FOODWAYS THROUGH TIME

Nick Catanzaro
Social Sciences: General, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 172
Mentor(s): Gary Schnakenberg (GEOGRAPHY, ENVIRONMENT, & SPATIAL SCIENCES)

The rise of the industrial agricultural system has led to an unprecedented capacity to produce, preserve, and ship food across the United States and the world. This has had an extreme impact on Great Lakes foodways and local systems of production, as many small producers are being outcompeted and demand for more expensive local foodstuffs has severely declined. The result of this has been that it is now common for a large portion of Great Lakes region resident's food to be produced hundreds, and in some cases thousands, of miles away from their communities. This, however, was not always the case. For the majority of American history, food was a locally produced resource that varied greatly based on the year and seasons. Industries such as commercial fishing, fruit and wheat production, and meatpacking became prominent in the Great Lakes regions. Few of these previous industries are still presently intact or at the level of production they achieved during their historical prominence. The current paradigm is a modern product, brought about relatively recently through environmental disruptions, American expansion, technological innovations, and reduced economic barriers from globalization. By examining agricultural production data and historical records, I will use GIS to create maps and spatially analyze the increasing distance between Great Lakes food producers and consumers and discuss the environmental and cultural impacts of this growing gap.

COMPARING SEXUAL MISCONDUCT PREVENTION MEASURES AMONG SCHOOLS IN THE AMERICAN ASSOCATION OF UNIVERSITIES: A FOLLOW-UP

Emily Saxon

Social Sciences: General, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 173
Mentor(s): John Waller (HISTORY)

Sexual misconduct is a major problem on college campuses across America. An estimated 20% of women experience sexual assault during their college years, with the overwhelming majority of women knowing the abuser. With sexual assault being so prevalent and abhorrent, what are the best practices in preventing it, and how closely are America's colleges conforming to these practices? The results of a study I conducted in 2018 indicated that a sample of America's large, public, research universities are falling behind in sexual misconduct prevention in a few key domains, specified as essential by the Centers for Disease Control and the National Sexual Violence Resource Center: many schools are employing too few staff in prevention-centered roles, not enough schools are mandating in-person prevention training for students, and only a minority of schools have sustainable funding for prevention. In my previous study, I used an original questionnaire to conduct telephone interviews with representatives from nine schools in the American Association of Universities, with the interviews being designed to gather information on whether these universities were implementing best practices in preventing sexual misconduct. The current study will introduce new data by re-interviewing the same universities in order to determine if any institutions' prevention programming has changed and by presenting possible reasons for the troubling inadequacies in the prevention efforts as identified during my initial survey.

LEVERAGING BEHAVIORAL SCIENCE TO ALLEVIATE SOCIAL AND BEHAVIORAL RISK FACTORS OF HEALTH

Nicole Jedding

Social Sciences: General, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 174
Mentor(s): Joseph Cesario (PSYCHOLOGY)

This poster evaluates a number of behavioral-science-informed strategies to reduce the impact of social and behavioral risk factors on public health outcomes. The CDC identifies five

social determinants of health (SDoH): neighborhood and built environment, health and healthcare, social and community context, education, and economic stability. Within these broad categories are nestled social and behavioral risk factors, such as smoking, social isolation, or food insecurity, which are more specific that SDoH and are associated with adverse health outcomes. SRFs are often systemic and at-risk populations could benefit from targeted interventions and policies to alleviate their impact. The behavioral sciences can have tremendous impact informing the design, implementation, and examination of public health promotion to the end of reducing healthcare costs and improving individual outcomes.

BEING BLACK AND ABROAD: HOW WHITE TRIP LEADERS AND WHITE PEERS INFLUENCE THE EXPERIENCES OF BLACK UNDERGRADUATE WOMEN ABROAD

Deandrea White

Social Sciences: General, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 175
Mentor(s): Heather McCauley (SOCIAL WORK), John Waller (HISTORY), Qiana Green (NEIGHBORHOOD SUCCESS COLLABORATIVE)

Participating in Education Abroad can be a challenge, financially, socially, culturally and psychologically, for minority students. A number of studies have shown that even those who manage to overcome financial barriers to participation often feel isolated and alienated by micro-aggressions when overseas. The aim of my study is to elicit from female minority students their experiences and reflections having studied abroad as MSU students. I am especially interested in the extent to which their enjoyment of studying in another country was affected by whether or not they were accompanied by non-white faculty and peers. In order to ascertain what makes for a meaningful and rewarding trip for students of color, I am using 'Sista Circles', a data-collection method which involves bringing together the study's subjects in a comfortable, supportive group environment in which they can speak candidly about their experiences. My UURAF presentation will present the results of these conversations with a view to providing useful information to the Office of Education Abroad.

YOUTH PERSPECTIVE ON IMPACTS OF A PROGRAM TO PROMOTE YOUTH INCLUSIVENESS, SOCIAL RESPONSIBILITY, AND COMMUNITY INVOLVEMENT

Maggie Jenkins

Social Sciences: General, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 176
Mentor(s): Ignacio Acevedo (PSYCHOLOGY), Malu Castro (PSYCHOLOGY), Sara Stacy (PSYCHOLOGY)

ANYTOWN TM is a community-based residential program that seeks to promote youth inclusiveness, social responsibility, and community involvement. Research and evaluation on the ANYTOWN TM program indicates that youth often experience positive changes as a result of participation. However, previous studies largely rely on youths' responses to psychological surveys that are pre-determined by academic researchers. To date, no studies have gathered youth perspectives to examine the impacts and efficacy of community-based residential programs. Given that many of these community-based residential programs center democratic practices and transformative goals, the absence of youth voice in their research and evaluation represents a methodological gap. Therefore, the goal of this study is to examine youth's perspectives on elements of the program that they perceived as most impactful. Further, differences in gender identity represent differences in social power which may affect youth's perspective on the program. Thus, we examined whether there were differences in these perspectives based on participants' gender identity. Through analyzing perspectives through a gendered framework, we can gather insights into how these programs

can continue to innovate their practices in a way that empowers marginalized attendees. To gather youth perspectives, program staff administered a brief, open-ended question to youth who participated in the program (i.e., "In what ways did participating in the program impact you?"). Using Graneheim and Lundman's guidelines for qualitative analysis, we will analyze these data to explore the ways ANYTOWN TM impacts youth that are most salient to them. Implications for future research and practice will be discussed.

EARLY FAMILY CONFLICT ASSOCIATED WITH FEWER MIND RELATED COMMENTS IN PLAY WITH TODDLERS

Camryn Ozuch, Genevieve Parkey, Grace Johnson, Jacob Schoener
Social Sciences: General, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 177
Mentor(s): Holly Brophy-Herb (HUMAN DEVELOPMENT AND FAMILY STUDIES)

Mind related comments are words and phrases that are interpretive of internal mental states. Mind related comments can be categorized into five sub-categories: desires and preferences, emotions, cognition, speaking, and epistemic states. Mind related comments have been correlated with secure attachments in relationships and stronger social skills. Data was collected on 142 mother-toddler dyads reflecting a low-income sample at 14, 24, and 36 months by the early head start research and evaluation project. Data from 14 and 24 month waves were used in the current study. Play interactions were transcribed verbatim and coded from free play interactions using Meins' coding manual. Mind related comments were identified, categorized, and deemed appropriate or non-attuned. Inter-rater reliability was in the good to excellent range (ICC's range from .72 to .96). Total score reflected the proportion of comments made during play that were mind related. Appropriate comments reflected those that were accurate mental state interpretations. Family conflict was assessed via the Family Relationships subscale of the Family Environment Scale. Higher scores reflected greater family conflict. Correlation analysis revealed that greater family conflict at fourteen months is negatively associated with total mind related comments (r=-.22, p=.03) and fewer appropriate mind related comments (r=-.22, p=.03). High conflictual family climates may make it more difficult for parents to accurately interpret their children's internal mental state. Research regarding how family processes are related to parenting practices helps to inform programming for early family support efforts.

HOW OFTEN MIND-MINDEDNESS OCCURS IN PLAY WITH TODDLERS

Dane Brennan, Roxanna Azmoudeh, Savannah Pohl, Tanya Zuykov
Social Sciences: General, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 347
Mentor(s): Holly Brophy-Herb (HUMAN DEVELOPMENT AND FAMILY STUDIES)

Mind-minded language refers to a parents interpretation of a child's thoughts. Variations in parental mind-minded comments are differentially related to child outcomes. For example, in a sample of low-income mother-toddler dyads, desire comments at 15 months predicted children's emotion comprehension at 24 months; whereas cognition comments at 24 months predicted emotion comprehension at 33 months. The focus of this presentation is how often Mind-mindedness occurs in play with toddlers. Videotaped free-play interactions from parent-child dyads when children were 14, 24, and 36 months old - provided by the Early head Start Research and Evaluation Project - served as our data set. Data from 24-month waves were used in the current study. Videos were transcribed then coded for mind-mindedness using Mein's coding manual. Mental state comments were identified, categorized, and classified as appropriate or non-attuned. Inter-rater reliability ranged from good to excellent (ICC's range from .72 to .96). A comprehensive report showed that 6% of comments were mind related,

which is consistent with other studies. Of the mind related comments made, 55% were appropriate, 45% were not attuned, 8% were cognitive, 3% emotion, 87% desire, 1% speaking, 1% trying, and no epistemic or physical. Mental state comments occur infrequently but impacts the child's later developmental skills - particularly among low-income mother-toddler dyads, where mind-mindedness has been predictive of both behavioral problems at ages 3 and 5, and reading performance at ages 7 and 11. Hence, examining the frequency of mind mindedness in infancy and toddlerhood may inform parenting practices that support early development.

MISGENDERING IN MEDIA REPORTS OF TRANSGENDER HOMICIDE

Hannah Frazier, Harnoor Kaur, Kai Benson, Rachel Kisnonsky
Social Sciences: General, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 348
Mentor(s): Christina DeJong (CRIMINAL JUSTICE)

The reporting of transgender homicides in the United States has been biased against victims. News reports often misgender victims--that is, they use the wrong pronouns in reference to victims or use their dead names. In addition, images of the victim may have been taken before their transition, and may not accurately represent their transgender status. These perpetuate a discriminatory attitude towards these transgender homicides in general media and the public. In this analysis, we will examine news articles about all transgender homicides that occurred in 2019. We will determine whether misgendering is still a problem in media reports, and make recommendations for best practices in reporting on transgender homicide.

THE ROLE OF ECOFEMINISM IN 21ST CENTURY ENVIRONMENTALISM

Ginny Lindberg
Social Sciences: General, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 349
Mentor(s): Patrick Arnold (CENTER FOR GENDER IN GLOBAL CONTEXT)

Ecofemism emerged in the late 20th century as a movement which explores the deep connections between women and the environment and uncovers the influence of patriarchal social structure on these interactions. Splintering off into two distinct factions, radical ecofeminists argued patriarchal societies degrade both women and the environment by equating the two while cultural ecofeminists encouraged the association of women with nature. However, despite this division, ecofeminism continues to play a unique role in 21st century environmentalism. Only by acknowledging the gendered aspects of environmental justice can the complex relationship between society and the environment be fully understood and destructive practices addressed. Additionally, ecofeminism provides an opportunity to draw attention to the rampant sexism in the environmental movement, opening the door for a new and more diverse generation of environmentalists essential to who must tackle our current climate and biodiversity crises.

PORTRAITURE AS A HUMANIZING QUALITATIVE METHODOLOGY

Lucy Gill, Parang Khanal
Social Sciences: General, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 350
Mentor(s): Carrie Symons (TEACHER EDUCATION)

In this poster presentation, we will discuss the qualitative methodology of portraiture (Lawrence-Lightfoot & Davis, 1997) and our ongoing exploration of its potential to deepen people's understanding of our shared humanity. We transcribed and analyzed our own

interview data that were gathered during a narrative inquiry study called The Stories Project. The study's context was a five-week, community-based, summer program for middle and high school immigrant and refugee-origin youth in the Upper Midwest, of the U.S. The 12 participants, ages 18 to 23, were interns or young leaders in the program; they represented seven home countries and eight home languages. As participants in the project, we were interviewed before and after the program; we documented daily reflections on our experiences in the intercultural context of the summer program; and we engaged in five two-hour reflective, arts-based dialogues facilitated by the research team. Our research question was: Given first-hand personal narrative data generated by both immigrant- and U.S-born youth, how does the methodology of portraiture lend itself to co-constructing humanizing stories that engender interest in and empathy for immigrants and issues relative to immigration?

ADDRESSING THE DIRECT CARE WORKFORCE SHORTAGE IN FEDERAL AND STATE LEGISLATION

Carrie Nielsen, Konstantine Wade
Social Sciences: General, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 351
Mentor(s): Jennifer Arbogast (SOCIAL SCIENCE)

Home health aides, home care aides, direct care workers, home care assistants, personal care aides—all of these phrases are used to describe the workers who take care of our nation's older adults in their own homes. Despite the current aging of our population, the direct care workforce and home care in general is a very under researched and under regulated section of the American economy. Furthermore, the aging population increases the demand for new workers, a demand that is going drastically unmet. At the current moment, much of the elderly are taken care of by family members or underpaid workers, and there are no official guidelines or training requirements for those that help the elderly with their most intimate and fundamental needs. As a result, it is hard to attract more workers to a field in desperate need of labor. In this project, we worked alongside IMPART Alliance to examine all of the legislative activity at the federal and state level regarding the direct care workforce and health funding for older adults. This research extends not only to the legislation being worked on, but also the lawmakers who champion and push for legislation in this field. Our research focuses on the sponsors, the voting, and the body of the bills to acquire an in-depth understanding of U.S. legislation and policy attempting to address the direct care workforce shortage.

ASSESSING THE RELATIONSHIP BETWEEN DEMOGRAPHIC RISK AND PARENT-CHILD DYSFUNCTION IN LOW-INCOME FAMILIES

Michal Babinski
Social Sciences: General, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 353
Mentor(s): Holly Brophy-Herb (HUMAN DEVELOPMENT AND FAMILY STUDIES)

Parental mind-mindedness refers to the parent's capacity to interpret their child's mental-states (defined as their emotions, preferences, etc) and is measured by the parents' verbal comments to their infant/toddler about their child's internal states. Mind-mindedness has been observed to impact positive outcomes in children, including attachment security, self-regulation, and theory of mind. While positive impacts have been linked to mind-mindedness, little research has been conducted on low-income parent samples. The study focuses on the relationship between demographic risks, parental dissatisfaction towards their parental-child dyad, and parental mind-mindedness. The study included 142 parent-child dyads who were

measured through 10-minute free play interactions between parents and their 24-month old toddlers. The interactions were then coded for mind-mindedness using Mein's (Meins & Fernyhough, 2015) manual. Data were collected by transcribing video free-play interactions and corresponding comments were coded in Excel as appropriate (reflecting child's internal state accurately), or non-attuned. Demographic risk was recorded at study entry and parental dissatisfaction with the parent-child relationship was assessed via the Parent-Child Dysfunctional Interaction subscale of the Parenting Stress Index (measures parent's dissatisfaction in relationship with the child). Utilizing a linear regression model to analyze the interaction between demographic risk and parental dissatisfaction revealed that parental dissatisfaction in the context of greater demographic risk was associated with fewer attuned mind-related comments (r=.033) in parent-toddler interaction accounting for ~18% of the variance in parental mind-mindedness, p=.000. A potential method for early parent-child relationship development may be to implement a home base mental health intervention.

HEARD AND IGNORED: AN INVESTIGATION OF WORKER AGE IN VOICE NON-RECOGNITION BEHAVIORS/INCIDENTS

Alex Dickmann
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 533
Mentor(s): Ann Ryan (PSYCHOLOGY), Caitlin Briggs (PSYCHOLOGY), Jo Alanis (PHYCHOLOGY)

Employee voice non-recognition has become an important topic in the workplace. Voice non-recognition refers to being ignored by supervisors or other coworkers when trying to give a suggestion to improve or enhance the workplace. Past research has demonstrated that stigmatized workers (e.g., racial minorities) are subject to greater voice non-recognition. Our study investigates whether one's age can be a factor in why one perceives their voice is being neglected. Research has shown that there is discrimination against older workers; however, this study is focused on whether this age bias influences perceptions of older workers' voice within the organization. Previous studies have shown that perceptions of older workers are often mixed in positive and negative stereotyping (e.g., viewed as experienced and wise, yet reluctant to change or lack creativity). This is a critical incidents study which directly asks older workers about their experiences with voice non-recognition. Participants were asked to describe their experience in detail, why they think their voice was ignored (i.e., attributions) as well as whether they experienced any consequences (e.g., negative emotions). We found that older workers were able to identify experiences of voice non-recognition because of their age, and these resulted in negative feelings and perceptions in the workplace. This project brings awareness to voice non-recognition experienced by older workers and will ultimately positively impact the overall work environment.

EXPERIENCES OF NATURAL SCIENCE MAJORS TRANSFERRING FROM TWO-YEAR COLLEGES TO FOUR-YEAR UNIVERSITIES

D'Mario Northington
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 534
Mentor(s): Vashti Sawtelle (LYMAN BRIGGS COLLEGE)

Transferring from a two-year college to a four-year university is becoming more relevant each year because more students are beginning their post-secondary education at two-year institutions. Over 80% of 2-year college students mention that they would like to receive a baccalaureate degree of higher; however, research shows that transfer and retention rates are relatively low, which led us to hypothesize that there are somethings that can be improved

for a better transitional process. Our research focuses on transfer students within the College of Natural Sciences at 4-year universities and their transitional process from their two-year college. The aim of this research is to understand the ways self-efficacy is impacted during students' transfer process, and thus knowing how to best support these students to increase the transfer retention rate. To test our hypothesis, semi-structured interviews, which captured students' self-efficacy towards their succession and transfer experiences, were conducted during the students' first year of transferring to their 4-year university. Our research team was then able to utilize these interviews to find trends in students' transfer experience and develop a codebook once we saw similarities of experiences in multiple interviews. Initial results from these interviews include both positive and negative experiences; however, places where students expressed the need for more support include lack of inclusion, limited academic advising, difficulties understanding how to navigate the campus and underdeveloped study habits. The developed transfer experience codebook will be used to code the transfer students' interviews along with a developing self-efficacy codebook in order to see the relationship between self-efficacy and the transitional process.

GIVING A VOICE TO GM STRIKERS: AN ANALYSIS OF STRIKERS' ATTITUDES DURING THE 2019 GENERAL MOTORS STRIKE

Dana Staublin
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 535
Mentor(s): Maite Tapia Y Van Maldeghem (HUMAN RESOURCES & LABOR RELATIONS)

This research investigates United Automobile, Aerospace and Agricultural Implement Workers of America (UAW) workers' attitudes towards the 2019 General Motors (GM) strike. It also looks at the support workers received, and the worker-union relationship during the strike. Since the 1980s, the number of workers on strike has been declining and has seen a significant drop in the beginning of the 21st century. Many failed strikes in the 1980s and 1990s has made unions feel that striking is not worth the risk until a recent surge in strikes began in the late 2010s. This research looks at the upward trend of strikes by analyzing the necessary elements to leverage a work stoppage. Partnering with UAW Locals 602 and 652 from the beginning of the 2019 GM strike, two professors created a survey evaluating workers' attitudes regarding the reasons to go on strike, solidarity and support during the strike, and the financial impacts of the strike on workers. The survey was handed out in local union halls over a three-day time span. An analysis of the survey results found that workers agreed that the strike was necessary and good for solidarity among workers, as well as that workers felt supported by the union, their families, and the broader community. This presentation will address the presenter's role in the research, as well as the results of the survey analysis. Additionally, it will discuss further research plans, including plans for additional analysis, and added data about workers' attitudes following the strike.

IS A PICTURE ACTUALLY WORTH A THOUSAND WORDS?

Mavis Asante
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 536
Mentor(s): Claire Vallotton (HUMAN DEVELOPMENT AND FAMILY STUDIES)

This study compares the types of emotions shown in children's storybooks in two countries by identifying and labeling characters' internal states. Marsh et al. (2003) suggest that there are differences in emotions expressed by people of different cultural backgrounds; but children's understanding of internal states is a developmental achievement in each culture. Internal state language includes thoughts, beliefs, desires, and emotions reflected in adults'

speech toward children (Farkas et al., 2018), and supports their prosocial development (Drummond et al., 2014). Booksharing elicits more internal state language in parents than does free play (Farkas et al., 2018). Given these benefits, it is important to determine which books present the best opportunities for teachers and parents to use internal state language to create healthier forms of communication between children and adults. After initial training and practice coding of images in children's storybooks was completed, it was determined that the original system was attempting to discern facial expressions that were indistinguishable, such as worried versus scared. Thus, modifications were made to develop a system with broader categories. It was also observed that coders from Chile were noticing more emotions (e.g. scared, surprised) in images that coders from the US were viewing as cognitive states (e.g. interested, curious). This is consistent with our understanding of differences in expression of emotion and emotion socialization across these cultures (Chang et al., 2017). This presentation will describe the development and modifications of the coding system, as well as next steps for data analysis.

A QUALITATIVE ANALYSIS OF DEVELOPER EXPERIENCES CREATING MENTAL HEALTH LITERACY WEB RESOURCES FOR YOUNG PEOPLE WITH A PARENT OR FAMILY MEMBER WITH MENTAL ILLNESS

Erin Kramer

Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 537
Mentor(s): Daniel Cavanaugh (SOCIAL WORK), Joanne Riebschleger (SOCIAL WORK)

The "Mental Health Info for Teens" (MHIT) website was designed by MSU faculty and students as a mental health literacy (MHL) resource for young people with a parent or a family member with a mental health diagnosis. Increased levels of MHL may promote resilience in young people facing increased levels of risk. This is a qualitative study guided by the following research question: How do social work students describe how their personal lived experiences with mental illness affected mental health literacy content that they developed for the MHIT MHL website? This project utilized methods from autoethnography and thematic analysis to assess how student website developers (n=3) described their experiences creating MHL content. Semi-structured interviews with flexible probes were used as writing prompts to capture student perceptions of how their personal lived experiences with mental illness may have affected the content they produced for the website. Following data collection, the data was coded and themed into primary and secondary themes. Intercoder reliability was calculated to attempt to increase the trustworthiness of the data. Early emerging themes included, (a) misconceptions about mental illness; (b) integration of lived experience; (c) empowerment; (d) challenging stigma and; (e) support. Possible limitations of the study may be related to inherent biases that are present in autoethnographical research. Further research could be conducted that interviews others who have created content for MHL resources.This research may encourage MHL content developers to use personal reflection to gain insight into how their lived experiences may affect content developed.

LATINX UNDERGRADUATE PERCEPTIONS OF THE PRESIDENCY

Janet Ibarra

Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 538
Mentor(s): John Waller (HISTORY)

This study takes a look at the Undergraduate Latinx Perceptions of the Trump Presidency. Given our current political culture, with a rise in fear, stress, and other health complications among the Latinx immigrant community, this study primarily focuses on the results of the

current anti-immigrant politicization and the effects it has had on Latinx Undergraduate students. Through a survey compiled of 34 students, primarily first-generation immigrant students, we conclude that there are consistent themes of the following: disagreement with the president's views, perceptions of the president, climate fostered by the president, and emotional responses to the climate fostered by the president.

SELECTIVE ANNEXATION: EVIDENCE FROM A SPATIAL TYPOLOGY OF MUNICIPAL BOUNDARY CHANGES

Jada Tillison-Love, Wisdom Henry
Social Sciences: General, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 539
Mentor(s): Noah Durst (SCHOOL OF PLANNING, DESIGN, & CONSTRUCTION)

Municipal annexation is the most common means by which local governments in the United States redraw their jurisdictional borders, with cities conducting more than 100,000 annexations totaling more than 5,000 square miles of territory since 2000. Prior quantitative research suggests that as municipalities annex territory along their jurisdictional fringe they often sidestep African American neighborhoods, a practice that appears to be exacerbated by state annexation laws and the recent invalidation of Section 4 of the Voting Rights Act by the Supreme Court (Durst, 2018; Durst, forthcoming). This process of racially selective annexation constitutes a form of local government gerrymandering with important implications for local democracy, voting rights, and access to local government services (Anderson, 2010). Quantitative research on selective annexation is limited. The limited research that does exist on the topic is largely aspatial, and thus fails to explicitly incorporate space as a means of measuring or explaining patterns of selective annexation. This research project will contribute to scientific knowledge regarding selective annexation by developing spatial measures to capture the various types of annexation and to examine the economic and political factors that drive them.

RUNNING BACKWARDS - SEX AND GENDER DISCRIMINATION IN SPORTS: THE CASE OF CASTER SEMENYA

Jacintha Glover
Social Sciences: General, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 719
Mentor(s): Joy Coates (AFRICAN AMERICAN & AFRICAN STUDIES)

This project focuses on intersexuality and race in relation to Olympic gold-medalist from South Africa, Caster Semenya, who was barred from racing in international sports in 2019. Why did the International Association of Athletics Federations (IAAF) bar her? Because of her high testosterone levels. Semenya's status as intersex and her high testosterone levels placed a stigma on her, and the IAAF decided her gender category laid outside the binary of man/woman. My research examines how her gender presentation and race played a role in the IAAF's decision to subject her to sex testing in 2017. By telling the stories of intersex and gender-nonconforming people of color, using their own words and personal experiences, this project will help fill the gap on the intersectionality of race and gender. It reveals a problem in society that is reflected in sports where people are put into gender boxes too narrow for this diverse world. This is especially true for people from the Global South who are examined under a white, Western lens that doesn't fit. Semenya's case is not isolated. Dutee Chand from India, another woman with a difference of sex disorder (DSD), was barred from running in 2014. This research project reveals the need to broaden the gender spectrum to allow individuals to decide who they are, especially those who are intersex. In order to do this,

organizations like the IAAF will need to stop using testosterone as a method to determine someone's gender.

A QUALITATIVE ANALYSIS OF THE TEXAS PRIVACY ACT (SENATE BILL 6)

Aren Kurth
Social Sciences: General, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 720
Mentor(s): Jae Puckett (PSYCHOLOGY), Kaston Anderson-Carpenter (PSYCHOLOGY)

An alarming amount of legislation has been proposed in the United States within recent years that would serve to restrict the rights of and further marginalize transgender people, legislation that often limits transgender individuals from accessing public spaces or facilities such as restrooms. In order to begin understanding what causes such legislation to pass or fail, the rhetoric surrounding these bills must be analyzed. One of the most monumental pieces of such legislation in recent years is the Texas Privacy Act (Senate Bill 6) from 2017, which details "regulations and policies for entering or using a bathroom or changing facility; authorizing a civil penalty" (Texas Legislature Online). After being pushed to the Committee for State Affairs, the hearing for SB 6 saw over 18 hours and 13 minutes of public testimony, and this vast amount of data has resulted in an incredibly nuanced representation of the views both for and against this bill. The video recording of this testimony was transcribed and was analyzed using Dedoose. A thematic analysis was conducted in which available data was reviewed to develop a coding scheme of experiences that appeared common in the data. A codebook was then developed and applied to the data. Once the data was coded, the relationships between these codes were examined and themes were identified that helped to explain arguments for and against this bill.

THE GENDERED DIMENSIONS OF URBAN WILD MEAT TRAFFICKING

Aalayna Green
Social Sciences: General, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 721
Mentor(s): Meredith Gore (FISHERIES & WILDLIFE)

Wildlife trafficking is a conservation challenge posing risks to biodiversity conservation and sustainable human-environment relationships; it is a serious crime comprising a substantial proportion of the global criminal economy. Urban bushmeat trafficking (UBT) is no less significant than wildlife trafficking in terms of its negative impacts on humans and wildlife. "Gender essentialism" suggests that women might not be involved in environmental exploitation, such as UBT, beyond roles traditionally associated with moral caretaking or "soft" crime (i.e., food preparation) because women have generally positive attitudes toward conservation. Insight about the gendered dimensions of UBT remain equivocal. We sought to fill gaps in knowledge and (1) characterize the gendered dimensions of UBT and (2) explore relationships between gender and three stages of UBT (source, transit, and destination). We used the case of pangolin, great ape and dwarf crocodile trafficking in Brazzaville, Republic of Congo; we conducted market surveys between November 2018 and February 2019, participatory risk mapping, and open access geospatial data to achieve objectives. Our analysis found women were active across source, transit and destination geographies for UBT. Women comprised roughly 94% of observed UBT selling roles, and were observed moving bushmeat across the supply chain. An unwritten declaration of almost immovable gender expectations may fuel misconceptions regarding gender within the industry and prevent UBT from being wholly investigated; thus interventions, programs and policies cannot be based on best available evidence.

CEDRAL COMMUNITY ENGAGED RESEARCH: THE ASSETS AND BARRIERS OF RURAL ENTREPRENEURSHIP

Amy Potchen, Kamya Harrison, Omari Sadiq
Social Sciences: General, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 722
Mentor(s): Vincent Delgado (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

In July of 2019, three undergraduate students at Michigan State University conducted community participatory research in the rural community of Cedral, Costa Rica, through the Residential College in the Arts and Humanities' Civic Engagement and Sustainability Program. After looking at the history of Cedral and talking with members of the community, the researchers uncovered the community members' fear that the population was shrinking due to urban migration. We found that creating successful local businesses could be a possible solution and came to two questions: 1) In regard to young people who have started a business here in Cedral, what resources and values do they have that other young people do not? 2) What are the main fears that people leaving high school have about starting a business in Cedral? The researchers conducted interviews with two different demographics: high school students preparing for graduation and the community's examples of youth entrepreneurs. The results showed that within the highschoolers, there was a desire to come back and start a business in the community. However, their fears related to the difficulties of acquiring the necessary resources and training to do so are the reasons they feel they need to leave post high school. It was also found that the successful young entrepreneurs who were able to come back had found ways to overcome the difficulties of starting a business, by finding useful training programs and grants.

AIDED LANGUAGE MODELING FAMILY STUDY

Hannah Schultheiss, Stephanie Lankfer
Social Sciences: General, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 723
Mentor(s): Sarah Douglas (HUMAN DEVELOPMENT AND FAMILY STUDIES)

Family supports are essential to the communication development of children who use alternative and augmentative communication (AAC). Evidence suggests that children's communication development hinges upon training provided to families (Dempsey & Keen, 2008) and that children experience the best outcomes when family members are well-trained and highly engaged (Seligman & Darling, 2017). However, families are rarely provided with necessary training to support AAC (Lund & Light, 2007). A recent meta-analysis highlighted that most studies focus narrowly on mothers (Kent-Walsh, Murza, Malani, & Binger, 2015). Additionally, no studies have attempted to train multiple family members to support the communication of a child who uses AAC, or measured the compounding effects of a whole family approach to supporting AAC, and few studies have utilized online approaches to provide training to families (Douglas, Kammes et al., 2017; Douglas, Nordquist et al., 2017). Research has shown that early models of language within the AAC are vital to the communicative competence of children who use AAC. In this study, we provided instruction in aided language modeling, utilizing concise, web-based training materials, implemented in natural settings in which family members typically interact. Specifically, we examined the feasibility and impact of an online communication training program to multiple family members of a child who uses AAC. Results from the studies will be presented with implications for communication partner training approaches. Next steps in the development and testing of the online training program will also be discussed based on the findings from this initial research.

THE EFFECTS OF MEDIA PORTRAYAL OF THE HISTORICAL MICHIGAN STATE FAIRGROUNDS

Nicole Severn

Social Sciences: General, Poster Presentation
Section: 4, 3:00 - 4:30 PM
Presentation Number: 724
Mentor(s): Marya Sosulski (SOCIAL WORK)

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.

BECOMING AN ENGAGED CITIZEN THROUGH COMMUNITY AFFIRMATION ACTIVITIES

Sarata Seydi

Social Sciences: General, Oral Presentation
Section: 5, 9:00 AM
Presentation Number: 758
Mentor(s): Kevin Brooks (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

Participating in civic engagement is critical in becoming an engaged citizen. My experiences working with an empowerment program for high school girls has taught me some significant lessons about the influence of living and working in engaged communities. Having opportunities to work with the girls in the program supported my belief that it is important to care about people and treat them as human beings. Furthermore, facilitating a session on affirmations reinforced my ideals on remaining positive. After the program ended, hearing that the girls appreciated our presence made me realize the impact of being an engaged citizen. In this presentation, I will highlight some of the activities we did in the program to promote positive health and wellness and girl empowerment.

EVALUATING THE PROSPECTS FOR ENERGY INDEPENDENCE IN SPAIN

Allie Virginski

Social Sciences: General, Oral Presentation
Section: 5, 9:15 AM
Presentation Number: 759
Mentor(s): Norman Graham (JAMES MADISON COLLEGE)

The struggle between economic stability and environmental problems continues to bring tension to questions about the future of energy in Spain. In line with EU mandates, Spain is capable of lessening its energy import dependence through development of renewable sources. Spain is already the fifth ranked country in installed wind power, and is considered a world leader for installed solar power. While Spain also has domestic potential to develop oil

and natural gas through hydraulic fracturing, at present there is a large dependence on oil and gas imports, with nearly 99% coming from neighboring North African and Middle Eastern countries. There is some interest in domestic shale fracking to reduce this external energy dependence. But there is also serious political opposition, especially in northern cities in Spain, due to the concern over potential geological and environmental hazards. Key questions addressed: What is the content and character of the evident opposition to fracking in Spain, especially in comparison with the more positive postures taken by other European Union countries such as Denmark, Romania, and the United Kingdom? What has stigmatized hydraulic fracking in this particular region? What is the current status of scientific opinion on the potential dangers and opportunities of fracking as an option for reducing energy import dependence? What are the costs and benefits of fracking development versus other domestic energy options?

FOOD INSECURITY ON CAMPUS: FOOD SECURITY FOR STUDENTS AT A BIG TEN UNIVERSITY

Sidney Linck
Social Sciences: General, Oral Presentation
Section: 5, 9:30 AM
Presentation Number: 760
Mentor(s): Jennifer Hodbod (COMMUNITY SUSTAINABILITY)

For many, the concept of food insecurity brings forth thoughts of developing countries, but it is also a critical sustainability issue in the U.S. and Michigan with previous research showing that college students may be especially vulnerable to food security issues. Affectionately profiled for their ramen-based diets, college students report consistent and prolonged periods of food insecurity due to either insufficient financial access to food or access to nutritional foods, which has adverse effects on physical health, mental health and academic performance. A random sample of graduates and undergraduates at Michigan State University (n=1453) participated in a web-based survey regarding their relationship with food. It was found that at 26.8% of that sample experienced either low or very low food security, with undergraduates at 31.7% and graduates at 22.6%. In alignment with the literature, we found that lack of time, money, and adequate food preparation resources influence types of meals consumed (i.e. home-cooked vs prepared). Here, we present the findings of a linear regression model that explains variation in food security status for undergraduate and graduate students. The findings of this model can be used to identify leverage points in the food system that would minimize food insecurity for college students, with lessons for universities throughout the US.

BRINGING EMOTIONS INTO OUR SEXUAL RELATIONSHIPS

Trevon Brooks
Social Sciences: General, Oral Presentation
Section: 5, 9:45 AM
Presentation Number: 761
Mentor(s): Sitara Thobani (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

General ideas regarding the topic of sex tend to fall into three categories: sex as a means of reproduction; a way of forming and strengthening particular relationships; or a means of experiencing pleasure. This research primarily focuses on; what does it mean to be sexually and emotionally intimate, how do gender roles and societal pressures effect how we view sex, and when are we able to practice sexual intimacy without emotions. My hope is that my research will encourage those who view my presentation, to look at sex from a wider perspective in order to challenge already existing notions of sex and sexuality. To accomplish this goal, I, draw on already existing research on sex; sexuality; and emotions as well as the results of a survey I designed and conducted with Michigan State students. From this

information I was able to create a presentation focusing on three main ideas; how sex affects us psychologically and physiologically; how ideas of sexual normalcy are created; and how emotions and sex are linked.

TURNING TOWARDS TERRORISM: USING LIFE-COURSE CRIMINOLOGY TO ANALYZE CASE STUDIES FROM THE PHILIPPINES

Allison Medley
Social Sciences: General, Oral Presentation
Section: 5, 10:00 AM
Presentation Number: 762
Mentor(s): Sheila Maxwell (CRIMINAL JUSTICE)

The reasons for individual participation in terrorism have been a focus of research across several disciplines, however, little research has examined this phenomenon from a criminological perspective. This project uses theory derived from Life Course Criminology (LCC) to examine case studies of individuals in the Philippines who have been incarcerated for involvement in terrorism. Using transcribed interviews originally conducted by Dr. Sheila Maxwell, life-course narratives of individuals from two different terrorist organizations were analyzed to identify life conditions, events, and significant "turning points," which may have created conditions conducive to processes of radicalization or decisions to participate in terrorism. Turning points are defined as "a change in one's social institutions," such as that of family, work, or school, and are theorized to mark a shift in one's life-course trajectory. Analysis of these life narratives indicated the presence of several important turning points; most notably changes in individual family structure and educational experiences. These experiences were identified as creating circumstances that either created motivation or opportunity to participate in terrorist activities. Results from this study demonstrate how LCC can be a unique and effective way to understand how individuals may embark on a path towards terrorism when certain life events and conditions are present. This can allow researchers, community members, and governments to better understand potential micro causes of radicalization and can assist in the development of appropriate responses and alternatives for individuals at risk.

IS THERE EVIDENCE FOR A FERGUSON EFFECT ON POLICING AND CRIME?

Erin Brooks, Pero Dagbovie
Social Sciences: General, Oral Presentation
Section: 6, 1:30 PM
Presentation Number: 772
Mentor(s): Joseph Cesario (PSYCHOLOGY)

There has been popular discussion of a "Ferguson Effect" since the shooting of Michael Brown in Ferguson, MO in 2014. It has been proposed that declines in discretionary policing have led to increases in crime across the U.S. since 2014. Data are analyzed to determine the support for this hypothesis.

LANGUAGE USE AND EMOTION REGULATION IN CHILDREN WITH AUTISM SPECTRUM DISORDER

Eric Locker
Social Sciences: General, Oral Presentation
Section: 6, 1:45 PM
Presentation Number: 773
Mentor(s): Kristin Rispoli (COUNSELING, EDUCATIONAL PSYCHOLOGY, AND SPECIAL EDUCATION)

The American Psychological Association defines "emotion regulation" (ER) as "the ability of an individual to modulate an emotion or set of emotions" (VandenBos & American

Psychological Association [APA], 2007). Development of ER begins early in development and is influenced by biology, cognition, and a child's socialization experiences in early relationships with primary caregivers (NICHD Early Child Care Research Network, 2004). Approximately 70% of children with Autism Spectrum Disorder (ASD) experience difficulties with ER (Totsika et al., 2010). Language impairments are commonly experienced by individuals with ASD (American Psychiatric Association, 2013). When compared to age-matched peers, on average, preschoolers with ASD score lower on measures of both receptive and expressive language ability with receptive language ability delayed more than expressive language ability (Hudry et al., 2010). This presentation is focused on exploring the connection between receptive and expressive language ability and emotion regulation in a sample of 3-6 year-old children with and without Autism Spectrum DisorderObservational and indirect measurements will be used.

IMMIGRATION AND COMMUNITY

William Qu
Social Sciences: General, Oral Presentation
Section: 6, 2:00 PM
Presentation Number: 774
Mentor(s): Louise Jezierski (JAMES MADISON COLLEGE)

1. How to solve the social conflict between new immigrants and native residents? 2. For the community, in what way can they help new immigrants to integrate into American society? 3. What kind of community can create a sense of belonging for immigrants? What is some difference between those communities and the communities that new immigrants do not feel welcoming? 4. How can the community build partnerships with local and state governments to help immigrants? What is the local organizations' role in helping build a sense of community and civic capacity for new immigrants? Such as NGOs, CDCs, and churches. Those questions are important for immigrants because the community is the place they begin their life in America. For immigrants, the life they experienced in communities will have a direct impact on their achievement in mainstream society. Moreover, for young second-generation immigrants and child immigrants, an unwelcoming community can cause serious psychological trauma. This project will look into specifically the Lansing community where had significant immigrants and observe their effort to create a welcoming environment for immigrants. The following will be some variables that I will consider: Belonging, Participation, Outreach, Connection, Education, Diversity, Culture, Religion, Government program, Citizenship, Local assistance, Language, Safety, Advocacy, etc.

AN ANALYSIS OF US STATE SECRETARIES OF STATE

Maysa Sitar
Social Sciences: General, Oral Presentation
Section: 6, 2:15 PM
Presentation Number: 775
Mentor(s): Matthew Grossmann (INSTITUTE FOR PUBLIC POLICY & SOCIAL RESEARCH)

There is a currently a lack of research and analysis on state level Secretaries of State. These positions, whose duties range in capacity from administrating elections to overseeing both elections and the department of motor vehicles, hold substantial administrative custody over the entirety of the US election system. This study attempts to provide context to these positions, as well as examine the trends in gender, political party, education level, and path to office for these individuals.

THE STRESSFUL EFFECTS OF DIGITAL OVERUSE

Anlin Larson, Carolyn Forrest
Social Sciences: General, Oral Presentation

Section: 6, 2:30 PM
Presentation Number: 776
Mentor(s): Dar Meshi (ADVERTISING AND PUBLIC RELATIONS), Shelia Cotten (MEDIA AND INFORMATION)

Technology use is growing across generations, and is quickly becoming labeled as "addictive." With the rising popularity and abundance of technology, our study examines the effects of overuse across the lifespan. We recruited participants, of varying ages, from Michigan State University and the surrounding areas to participate in an in-depth interview. These interviews included a survey, the interview, and photographing the participants' screen time use (e.g. Apple Screentime, Android Digital Wellbeing) to characterize the participants' perceived overuse of technology. The quantity of time spent using smartphones or social media varied across age groups, with participants self-reporting anywhere from less than one hour to more than ten hours, and an overall average of 4.22 hours spent on their phones and 2.76 hours spent on social media on a given weekday. Even within similar age groups, these self-reported numbers vary, but we found that across all age groups, people tended to incorrectly report their usage. We also found that stressful effects of technology varied between age groups, with young adults being focused on comparing themselves to others and having a fear of missing out, and older adults being worried about paying attention to their children or other social ties. Across all age groups, we have found that most of our participants want to decrease the amount of time they spend on their smartphones and social media, and would like an effective method to help them do so.

THE POLITICAL ECOLOGY OF RESILIENCE AFTER NATURAL DISASTERS: A CASE STUDY OF PUERTO RICO AFTER HURRICANE MARIA

Andrea Vera, Nate Bollman
Social Sciences: General, Oral Presentation
Section: 7, 3:30 PM
Presentation Number: 778
Mentor(s): Stephen Gasteyer (SOCIOLOGY), Susan Masten (CIVIL & ENVIRONMENTAL ENGINEERING)

This study investigates the characteristics and distribution of resilience in the context of Hurricane Maria's legacy on Puerto Rico as a coastal area devastated by natural disaster and evaluates the effectiveness of current or proposed engineering solutions. We begin by analyzing global trends in climate change and its visible effects on natural disasters. We examine the political-ecological context, specifically examining the inequality both in living conditions and vulnerability and how these factors affect resilience to natural disasters in Puerto Rico. We investigate the regulations, policies, and conditions that exacerbated the impacts of and ability to adapt to disasters. The study concludes with recommendations for transformation and policy change in Puerto Rico that are aimed at ensuring equity in future efforts for disaster response and relief.

EFFECTS OF POLICY AND PROGRAMS ON REDUCING STUNTING RATE IN RURAL PARTS OF RWANDA

Louanges Ndayishimiye
Social Sciences: General, Oral Presentation
Section: 7, 3:45 PM
Presentation Number: 779
Mentor(s): Dave Weatherspoon (AGRICULTURAL, FOOD & RESOURCE ECONOMICS)

Rwanda has experienced tremendous economic growth over the past decade and policymakers expected big improvements in nutrition status. However, Rwanda still has one of the highest child stunting rates in the world. The purpose of this research is to examine the effects policy and programs have on reducing child stunting in the rural parts of Rwanda. In

addition to the literature review, we run a descriptive statistic to determine which variables to include in the model. A Logit model was estimated to determine the factors that are related to the reduction of stunting in rural Rwandan children. Of the children studied (N=4002), those 1494 were stunted. Children who live in rural areas are more stunted than those who live in urban settings. Boys have a higher probability of being stunted than girls. The model showed that less educated mothers positively contribute to stunting. The distance to health care facilities as well as to the main road is another factor that contributes to a higher stunting rate in rural areas. Additionally, low dietary diversity in children in rural areas play a role in stunting. New and existing programs and policies need to encourage rural households to increase the diversity of food consumed. Also, community-based support groups can be created with committed leadership and intensive training so that they can encourage women and children to eat healthy meals. Moreover, the government needs to build more health facilities in rural areas.

TRAUMATIC BRAIN INJURY AND VIOLENT CRIME

Alex Dean
Social Sciences: General, Oral Presentation
Section: 7, 4:00 PM
Presentation Number: 780
Mentor(s): Heather McCauley (SOCIAL WORK)

The crossover between the neurological and forensic areas is a relatively new field that has emerged in the past decade due to new technological advances, so there is limited scholarly research regarding the strength of this connection between TBI and violent crime. The validity of this putative connection is extremely important to establish, as its presence leads to questions regarding the insanity defense within the American legal system. If someone can be judged to be lacking the mens rea, or intention to do wrong when committing a crime, due to a biological mental illness, could the same be said for someone who is lacking mens rea due to a legitimate brain injury? To answer this question and further expand on how the justice system treats criminals with TBI, it must first be clear that there is a significant link between TBI and violent crime. This meta-analysis attempts to establish that link and examines the disparity in the interactions between the justice system and defendants with a TBI, while also providing possible solutions to the later. Results from a large-scale literature review revealed a loose consensus on the positive relationship between TBI and violence or violent crime and an examination of cases and further studies highlighted the disparity among the treatment of those with a TBI in the justice system. Further research is needed on the most effective techniques for implementing scanning procedures for TBI within the justice system and what treatments are best practice for those incarcerated with a TBI.

IMPACTS OF STATE POLICIES AND SOCIAL REGULATION UPON EUROPEAN MUSLIMS

Jena Khasawneh
Social Sciences: General, Oral Presentation
Section: 7, 4:15 PM
Presentation Number: 781
Mentor(s): Ani Sarkissian (POLITICAL SCIENCE)

The role of Western European states in religion has been long subject to controversy. With the rise of Muslim immigration in Europe, this role has been especially scrutinized, exposing states to criticisms of the unequal ways in which legislation treats religions. This has led to examinations of the way in which state restriction and support of religions impact the status of members of different religions at both the group and individual levels. Understanding the delegation of a certain status upon a religious group, however, cannot be achieved through the examination of state policies alone: power dynamics and oppression are enforced not only through positive law, but unofficially within the context of social institutions and

interpersonal relationships. The aim of this paper is to examine the way in which government policies of support and restriction work to subordinate certain groups in comparison to less explicit forms of domination, occurring through means such as social regulation and institutional constraints. In doing so, this paper will establish the extent to which these different forms of oppression are effective in the subordination of Muslims. Thus, it will be determined whether the subordination of European Muslims is enforced in a manner that is primarily social or through official state action.

SOCIOLOGY

QUALITATIVE ANALYSIS OF RACE AND PRIVILEGE

Israel Solano
Sociology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 315
Mentor(s): Clifford Broman (SOCIOLOGY)

This research is to understand the relationship between race and privilege. Qualitative and survey methods will be used to collect data. Volunteers will answer a series of questions and discuss their responses. Different races will be used for data collection. Responses are expected to be similar between whites and asians. They are also expected to be different than black, latinx, and natives. Black, latinx, and natives are expected to be significantly similar in responses.

FAMILY MEALTIME COMMENTS AND FOOD SECURITY

Sam Motzny
Sociology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 316
Mentor(s): Holly Brophy-Herb (HUMAN DEVELOPMENT AND FAMILY STUDIES)

Recent studies have highlighted the adverse effects of food insecurity on health outcomes, yet little is known about the context of this relationship (Miller et al., 2016; Morales & Berkowitz, 2016). This suggests the necessity to develop a better understanding of how mealtime interactions are influenced by food (in)security. We hypothesized that parental comments regarding food consumption would be more prevalent among food-insecure, impoverished families. Specifically, we were interested in threats to eating, directions to consume more food, and hunger cues. As part of an on-going study, 64 low-income families, approximately 50% of whom are food-insecure, were videotaped in their homes during mealtimes and videos were then coded for parent and child comments about food-related content. The coding categories reflected comments about nutrition, food preferences, health benefits, origins and preparations of food, hunger and satiation cues, quantity, manners, support for children's autonomy at meals, and praise. The means, frequencies and quantities of these types of food related comments along with their correlations to demographic characteristics such as income and food security status were then analyzed using SPSS. This poster will report on descriptive relationships between food-security, demographic status and prevalence of these food-related comments. Studying the relationship between food security and comments during mealtime interactions between parents and children could ultimately be used as an indicator for long-term health outcomes.

ADDRESSING MENTAL HEALTH IN THE BLACK COMMUNITY

Erin Jones
Sociology, Poster Presentation

Section: 1, 11:00 - 12:30 PM
Presentation Number: 317
Mentor(s): Clifford Broman (SOCIOLOGY)

The problem that my research addresses is how to dismantle the stigma of mental health problems within the black community as an effort to improve their social stature. In order to solve this problem, it is necessary to understand the current mental states of this specific community in addition to their current economic, educational, and social positions. That being said, I'm particularly interested in whether or not the black community acknowledges their origins of African ancestry, as well as whether do they believe it has contributed to generational mental and social hardship. My research thus focuses on questions about self-identification, social support, and depression. I have conducted an interview-based research study designed to measure social belongingness and depression, with the goal of producing a well-being analysis. I anticipate that the results of my work will demonstrate the need for mental health rehabilitation due to depression levels, education gaps, and low social belongingness. Overall, this well-being analysis will tell us about more about these factors, as they relate and influence on another, creating social status variances.

DO WE GET ALONG? UNDERSTANDING RACE RELATIONS AND RACIAL CLIMATE AT A PREDOMINATELY WHITE INSTITUTION (PWI)

Antanae Love-Humble, Bri Johnson, Casey Pearson
Sociology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 318
Mentor(s): Terry Flennaugh (TEACHER EDUCATION)

As a part of a youth-led undergraduate research project, students examined how their classmates at a large mid-West research university understood the relationship between different racial groups on campus. Over 200 students responded to an online survey to gather information on sources of information about racial climate on campus, stereotypes about different racial groups, and individual attitudes about socializing with students from different racial groups. Survey results highlight the complexity of racial understandings and social practices at racially diverse college campuses. Study findings have implications for higher education researchers and university staff and students interested in bettering the racial climate on college campuses.

DISRUPTING THE SCHOOL TO PRISON PIPELINE: ART AND CONTEMPLATIVE PRACTICES WITH INCARCERATED YOUTH

Claire Marks-Wilt
Sociology, Poster Presentation
Section: 1, 11:00 - 12:30 PM
Presentation Number: 319
Mentor(s): Guillermo Delgado (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

This project serves to demonstrate how art and contemplative practices matter in the lives of incarcerated youth, including their communities at home and at the detention center. At the same time, the project has allowed students at the Residential College in the Arts and Humanities and the community at large, to deepen their understanding of how the arts can build/unite people, give voice to the unseen/unheard, and imagine communities without prisons.

MIXED RACE IDENTITY IN AMERICA

Justice Fowler
Sociology, Poster Presentation
Section: 1, 11:00 - 12:30 PM

Presentation Number: 320
Mentor(s): Clifford Broman (SOCIOLOGY)

The world's opinions towards mixed race people have varied throughout all of history; multi-racial people have existed at the bottom of the ladder and at the top; as aristocrats and leaders, as outcasts and rejects—all based on bloodline and parentage. This study focuses on the current attitudes and behaviors of our generation towards mixed race people in the United States and attempts to answer a significant question: where do mixed race people stand in today's society? This research focuses on topics such as interracial dating, color blindness, miscegenation and identity struggles, as well as social media's effect on the widespread perceptions of multi-race Americans. My results are a combination of group discussions, one on one interviews and online surveys with college students between the ages of 18 and 25, all from different cultural and racial backgrounds. I will be presenting my findings, which will explore how opinions towards mixed race people have changed, along with participants ideas on how they will continue to change in the near future. I will also be talking about how the background of each participant may have affected their responses by exploring disparities in cultural background, household income, and education, among other factors. The purpose of this research is to offer a better understanding of the ever changing definition of Mixed Race Identity in America.

BEHAVIOR OF SELF-ORGANIZING AGENTS IN A TIER-BASED SYSTEM

Benjamin Laubach, Gian Batayola, Hanshi Zuo
Sociology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 687
Mentor(s): Anand Nair (SUPPLY CHAIN MANAGEMENT)

This research project examines how a tier-based incentivization system affects team composition and transaction among individuals. In the model agents interact with each other using Prisoner Dilemma's type interactions. The project will use agent-based simulation modeling approach for this research investigation. In the model each agent is characterized by individualized attributes and rules. The agent-based model will illuminate patterns emerging from the interaction. The data collected from the simulation model will be analyzed using statistical methods. Tier-based group formation and incentivization is a popular occurrence in academic institutions, private corporations, and society in general. This research will shed light into the composition of individuals and if they can move through tiers based on who they interact with. Questions such as can lower skilled individuals move to the top ranks will be answered.

ENVIRONMENTAL RACISM AND THE FLINT WATER CRISIS

Elena Carter
Sociology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 688
Mentor(s): Steven Gold (SOCIOLOGY)

The city of Flint, having previously been a booming auto city, became the center of attention in 2015, when the Flint drinking water was found to be contaminated by lead. The corporate greed, political inactivity, and environmental catastrophe that lead to the Flint water crisis can be explained by a single sociological concept; environmental racism. In this paper, I will examine the multiple failures of public health officials to keep the water in Flint safe for the public. Additionally, this paper will examine the multiple urban crises, specifically paying attention to the factors that caused the disaster, and the reaction of the public after the information was released. This paper will conclude with the reactions of the government and

the public as the news was released, and the progress (or lack of) that has been made since the discovery of the lead in the Flint tap water.

VOTING ATTITUDES OF RACIAL & ETHNIC MINORITY GROUPS IN MICHIGAN ACROSS AGE

Abigail Knauss
Sociology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 689
Mentor(s): Clifford Broman (SOCIOLOGY)

In 2013, nine percent of Michigan's population spread across six cities lived under the control of a state-appointed emergency manager. However, this nine percent disproportionately included half of Michigan's African American residents. Many see emergency managers who have nearly absolute control of the city as an obstruction to democracy, since they are not voted in or voted out by the people. Analyzing data collected from a survey of Michigan State University students, with data from qualitative interviewing of several Michigan residents, this work hopes to investigate the relationship between voting attitudes and race/ethnicity. Moving forward with this work it is hoped we can determine why these attitudes may develop, make positive constructive changes to the system, and increase minority voting rates.

COLORBLIND IDEOLOGY AND DISCRIMINATION

Lyndsay Stickley, Taylor Kovach
Sociology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 690
Mentor(s): Clifford Broman (SOCIOLOGY)

This paper examines colorblind racism, and its impact on older and college-aged persons. We draw on the discrimination literature, which argues for the impact of colorblind ideology on the lives of people aged 18 to 29, and 40 +. Depending on the subjective ratings of discrimination to different racial and ethnic backgrounds, we discuss the varying influence on colorblind racism. We explore how the college and high school atmosphere contribute in the literature review.

UNDERSTANDING INSTITUTIONAL RESOURCES AVAILABLE FOR SUPPORTING SURVIVORS OF DOMESTIC VIOLENCE IN NORTHERN GHANA: A SOCIOLOGICAL STUDY IN GHANA

Andala Yakubu
Sociology, Poster Presentation
Section: 2, 3:00 - 4:30 PM
Presentation Number: 691
Mentor(s): Soma Chaudhuri (SOCIOLOGY)

This study critically examines institutional resources available for supporting survivors of domestic violence in northern Ghana. Additionally, the study analyzes how violence perceived by individuals and the institutions, and implications of difference in perceptions on the way policy outcomes are framed. Finally, the study looks at civil society's responses to domestic violence as experienced by northern women of varying age groups, socio-economic status, and professional standing. The study defines domestic violence as abusive behavior perpetrated by husbands or male partners in an intimate relationship. To achieve the above goal, the study reviewed the already existing provisions in the country's constitution and the specific steps the Ghanaian government has taken to address the issue. Also, the study evaluated the support resources available to survivors using primary data that consists of

group discussions and in-depth qualitative interviews with the actors of domestic violence—activists, and non-governmental organizations. Some of the themes that arise from this study in relation to the cause of the abuse include but not limited to, the continuous dependence of Ghanaian women on Ghanaian men, limited educational and training opportunities for Ghanaian women, lack of decentralizations of women organizations and other stakeholder agencies, ignorance of the Ghanaian women about their rights, and cultural beliefs that justify abuse against women. In conclusion, the study provides policy recommendations to improve the resources and success paths of resources available to survivors of domestic violence in Ghana.

HOW TO BE A REFUGEE: EXPECTATIONS AND IMPLICATIONS OF THE 1980 REFUGEE ACT FOR U.S. REFUGEES

Katarina Huss
Sociology, Oral Presentation
Section: 3, 11:00 AM
Presentation Number: 791
Mentor(s): Anna Pegler-Gordon (JAMES MADISON COLLEGE)

The U.S. refugee resettlement program is embedded with narratives about who refugees are, and how refugees should integrate into the U.S. The narratives and expectations shape refugee experiences with resettlement, but in unequal ways. Local resettlement agencies and nonprofits mediate the resettlement experience in ways that simultaneously resist and enforce expectations about refugees. This paper centers the role of policymakers and service providers in the construction of refugeeism in the U.S. Utilizing a critical refugee studies framework, the research explores resettlement using interviews with service providers in the mid-Michigan area, a statistical critique of the Annual Survey of Refugees, and a historical and political analysis of the 1980 Refugee Act. I pose the question, what effect does the conceptualization of refugees in refugee resettlement policy have on refugees in the U.S.? How is the process of resettlement mediated by local resettlement agencies and nonprofits? I argue that refugee resettlement policy emerged in a specific political and historical moment that constructed refugees as economic objects best suited to integrate in the U.S. through labor markets. This conception of refugees is ineffective for facilitating resettlement and not adequately supported by the program. However, the policy biases are upheld by narratives about refugees as individuals or ethnic groups. Local resettlement agencies and nonprofits as service providers in resettlement are able to resist the narratives and provide refugees with additional resources, but their mediation is dependent on their own organizational capacity and position within the local and refugee community.

THE DISPROPORTIONATE ACCESS TO CLEAN WATER AND ADEQUATE SANITATION IN THE UNITED STATES: CENTRAL VALLEY, CALIFORNIA

Conner Williams, Nicole Carlson
Sociology, Oral Presentation
Section: 3, 11:15 AM
Presentation Number: 792
Mentor(s): Stephen Gasteyer (SOCIOLOGY)

There is a widely held misconception even among government officials that not having access to clean water is a problem that only underdeveloped countries face. But for many of those residing in disadvantaged communities throughout the United States, functioning without clean water and proper sanitation has become a daily reality. In 2012, a severe drought began in California that was declared finished in 2016. Though it is the first state to legally recognize clean water as a human right, improvements have been extremely slow-moving. As a result, communities, especially unincorporated communities such as East Porterville in the Central Valley, have struggled for many years. This region is populated mostly by poor farmers of

Mexican and Latino descent; their grievances can in part be attributed to California's lengthy history of racial and ethnic discriminatory patterns in relation to land use, resulting in areas systematically starved of resources. Their main water source is groundwater, which has been irreversibly contaminated. The people do not possess the funds necessary to fix these infrastructural issues, and there has been trouble in getting all parties to cooperate. Annexation into neighboring cities does not solely solve this issue, though it has been treated as a fix-all by those in power. East Porterville has been labeled a success story by the state government, but there are conflicting viewpoints between officials, residents, and community leaders on what happened here. This research analyses these differences in order to fully comprehend the situation from all angles.

WATER INJUSTICE IN THE UNITED STATES

Conner Williams
Sociology, Oral Presentation
Section: 3, 11:30 AM
Presentation Number: 793
Mentor(s): Stephen Gasteyer (SOCIOLOGY)

Here in Michigan, most of us are aware of the clean water crisis in Flint and water shutoffs in Detroit. Our research indicates that these incidents are not anomalies - communities across the United States are struggling to access reliable clean water and proper sanitation every single day. This presentation explores the historical processes that have produced inequalities in access to clean water and sanitation, the current forces perpetuating them, and what is being done in these communities to address the problem. Our research has been informed by the analysis of interviews conducted in six communities across the U.S. and the analysis of public documents. We've identified the most prominent factors that lead to inequalities in clean water and sanitation access in the hopes of attracting the attention, time, and resources necessary to remedy this problem.

BLACK FEMINISM IN AFRO-DANCE

Malahni Ngalle
Sociology, Oral Presentation
Section: 3, 11:45 AM
Presentation Number: 794
Mentor(s): Amanda Flaim (JAMES MADISON COLLEGE), Omowumi Elemo (JAMES MADISON COLLEGE), Rashida Harrison (JAMES MADISON COLLEGE)

Women of the African diaspora passionately create, preserve, and maintain history in ways that are the most authentic to them. These methods are derived from traditional forms of expression that include dance and storytelling. As a way to combat patriarchal oppression and celebrate the history of black women and their experiences, there has been a growing prevalence of autobiographies and auto ethnographies by black women, to tell a more accurate story. They highlight the uniqueness of the black experience and defeat stereotypes maintained by non-black, non-woman ethnographers. In this study, I have used a semi-autobiographical ethnographic approach to analyze Afro-dance, a mixture of a variety of modern African dance styles (typically to Afrobeats and other African music styles). Through research, I have found that Afro dance expresses a unique form of feminism that is fused with cultural expression. Afrobeats, the genre that dominates Afro-dance has become the international phenomenon that connects the African diaspora across the seas. As the Afrobeats music community consists mainly of men, but the Afro-dance community consists mainly of women, patriarchal patterns of male dominance tend to reflect themselves in modern African music performance. In order to combat this, Afrobeats artists must allow their female dancers a voice, respect their rates, and value their craft. Afro-dance is not only a form

of expression, but for woman Afro-dancers, it is a business transaction. While women are the face of the genre through classes and performance, they must also be the recognized voice.

PERCEPTIONS OF QUEER IDENTITY AND SPEECH IN ISRAEL

Jared Kaczor
Sociology, Oral Presentation
Section: 3, 12:00 PM
Presentation Number: 795
Mentor(s): Yore Kedem (LINGUISTICS & GERMANIC, SLAVIC, ASIAN, & AFRICAN LANGUAGES)

I am interested in understanding how Israelis perceive queer identity and queer speech in the context of queer people are becoming more prevalent in Israel culture. To better understand, how the general populous conceptualizes and treats their queer peers. I found that a multitude of factors influenced any indiivudals response, which include their religion, thier level of nationalism, as well as thier country of oirgin.

TOXICLOLGY & PHARMACOLOGY

EFFECTS OF RGS PROTEINS ON GOF GNAO1 MUTANTS

Maisah Akram
Toxicology and Pharmacology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 91
Mentor(s): Richard Neubig (PHARMACOLOGY & TOXICOLOGY)

GNAO1 is a gene that encodes the alpha monomer of the Go protein, a G protein signal transducer. Mutations in GNAO1 have been linked to both early infantile epileptic encephalopathy (EIEE) and neurodevelopmental disorder with involuntary movements (NEDIM). The loss-of-function (LOF) mutants have been shown to cause epilepsy while the gain-of-function (GOF) and normal function (NF) mutants result in movement disorders. Gain-of-function mutant G184S was found to be unresponsive to the inhibitory influence of RGS-proteins. In order to see if this is consistent among all GOF mutants, we will perform cyclic-AMP assays on HEK cells transfected with GOF mutants in the presence of RGS proteins. These results may implicate new mechanisms for drug compounds used to treat GOF GNAO1 mutants.

INHIBITION OF AURK, PLK, AND TUBULIN IN BRAF-I RESISTANT MELANOMA

Maisah Akram
Toxicology and Pharmacology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 92
Mentor(s): Richard Neubig (PHARMACOLOGY & TOXICOLOGY)

Melanoma is the deadliest form of skin cancer and results in approximately seven thousand deaths annually. More than 50% of all melanoma tumors contain mutations in the BRAF gene, most occurring in valine 600. While tumors are initially responsive to BRaf inhibitors, most tumors develop resistance within years. In our prior work, we discovered that BRAFi-resistant melanoma cells are more sensitive to PLK and AURK inhibitors. In an effort to understand why, we are observing mitosis in both the drug resistant cells and the parental non-resistant cells. We hypothesize that the resistant cells have inherently dysregulated mitotic progression. Melanoma cell lines were engineered to express GFP-tubulin which labels the mitotic spindle and Scarlet-histone 2A (H2A) to label the DNA. Fluorescent live-cell

microscopy is used to visualize and track cells undergoing mitosis. In our preliminary experiments, I developed methodology to perform live-cell imaging of these cells with images taken at two-minute intervals. Work to characterize differences between the parental and resistant cells under untreated and drug-treated conditions is now underway. Characterizing compounds that are selective for resistant cells may yield new mechanisms to prevent or reverse drug resistance in melanoma.

EFFECTIVE INHIBITION OF THE SOLUBLE EPOXIDE HYDROLASE (SEH) TO IMPROVE TREATMENT OF METABOLIC DISEASES

Adam Hafner
Toxicology and Pharmacology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 93
Mentor(s): Katayoon Maghami (CHEMISTRY), Kin Sing Lee (PHARMACOLOGY & TOXICOLOGY)

The Soluble Epoxide Hydrolase (sEH) is an enzyme which is responsible for the hydrolysis of various fatty acids to their corresponding 1,2 diols. This enzyme has a pro-inflammatory effect in many diseases such as atherosclerosis, hypertension, diabetics and liver diseases. Several studies have shown that through the inhibition of sEH, various fatty acids, such as epoxyeicosatrienoic acid (EETs), increase their anti-inflammatory response. Our research goal is to find an sEH inhibitor that binds longer which leads to improve the biological effect in different diseases. To further explore the effects of this inhibition, a library sEH inhibitor compounds is tested by in-vitro high throughput screening. Highfive cells (cabbage looper ovary) are used for expression of sEH because they are best suited to express recombinant proteins and produce a larger amount of recombinant proteins. While also being more susceptible to baculoviral infection than other cell lines. For purification of sEH, Resin Chromatography technique used because the resin can bind to sEH through the interaction with its C-Terminal Domain. The basic purification mechanism includes binding, washing, and elution. To confirm the purity of sEH, the enzyme is recognized by using gel electrophoresis and tested its activity by using a fluorometric assay. This enzyme is a promising target in the development of new inhibitors and treatment of several metabolic diseases.

DOCOSAHEXAENOIC ACID (DHA) PREVENTS SILICA-INDUCED LUPUS FLARING IN THE TOTAL WESTERN DIET

Liz Ross
Toxicology and Pharmacology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 94
Mentor(s): James Pestka (FOOD SCIENCE & HUMAN NUTRITION), Kate Wierenga (FOOD SCIENCE & HUMAN NUTRITION), Preeti Chauhan (FOOD SCIENCE & HUMAN NUTRITION)

Systemic lupus erythematosus (lupus) is a debilitating autoimmune disease that affects nearly 1.5 million Americans. The inhalation of crystalline silica (cSiO2) by lupus-prone female NZBWF1 mice mimics human lupus flaring, which can be prevented by supplementing mouse diet with the ω-3 fatty acid docosahexaenoic acid (DHA). A limitation of prior studies was the use of a purified diet that does not reflect the high American intake of saturated fats (SF), ω-6 fatty acids, and total fat, together considered proinflammatory. To address this, we used a modified Total Western Diet (mTWD) that emulates the 50th percentile U.S. macronutrient distribution to discern how DHA supplementation and/or SF/ ω-6 reduction influences cSiO2-triggered lupus flaring in female NZBWF1 mice. Six-week-old mice were fed experimental diets for 2 weeks, intranasally instilled with 1 mg cSiO2 or saline vehicle weekly for 4 weeks, and tissues assessed for lupus endpoints 11 weeks following cSiO2 instillation. In mice fed basal mTWD, cSiO2 induced robust proinflammatory cytokine and chemokine elevation,

leukocyte infiltration, ELS neogenesis, and autoantibody production in the lung, as well as early kidney nephritis onset. Consumption of mTWD containing DHA calorically equivalent to a human dose of 5 g per day dramatically suppressed all cSiO2-induced lupus endpoints. While decreasing SF and ω-6 in mTWD modestly inhibited disease markers, DHA addition was required for maximum protection. Taken together, DHA supplementation at a translationally relevant dose was highly effective in preventing cSiO2-triggered lupus flaring in NZBWF1 mice, even against the background of a typical Western diet.

ENDOTOXIN-INDUCED MUCOUS CELL METAPLASIA IN MURINE AIRWAYS IS DEPENDENT ON INNATE LYMPHOID CELLS

Sarah Shareef

Toxicology and Pharmacology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 95
Mentor(s): Jack Harkema (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION), James Wagner (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

Background: Farm workers who are repeatedly exposed to endotoxin-laden organic dusts may develop airway inflammation and hyperproduction of airway mucus. In mice, inhaled endotoxin causes airway inflammation and a new onset of mucus-producing epithelial cells (mucous cell metaplasia; MCM). The role of innate lymphoid cells (ILC) in endotoxin induced MCM has not been previously investigated. Methods: We hypothesized that endotoxin induced MCM is dependent on ILC, and not T or B lymphoid cells. ILC-, T- and B-cell sufficient C57BL/6 mice, ILC-sufficient (but T- and B-cell deficient) Rag2-/- mice, and lymphoid cell-deficient Rag2-/-Il2rg-/- mice (devoid of ILC, T and B cells) were intranasally instilled with 30 ml of saline containing 0 g (controls) or 10 g of E. coli-derived endotoxin for 9 weekdays. Lung tissues were processed for microscopic examination, morphometric analysis of histochemically stained mucus in airway epithelium, and qRT-PCR analyses for MCM-related gene expression. Results: Endotoxin induced MCM was only present in airways of ILC-sufficient mice (C57BL/6 and Rag2-/-). No MCM was present in lungs of endotoxin-instilled, ILC-deficient Rag2-/-Il2rg-/- mice or saline-instilled control mice. In addition, endotoxin induced overexpression of MCM-related genes was markedly less in ILC-deficient mice as compared to ILC-sufficient mice. Conclusion: These results confirmed our hypothesis that MCM in the pulmonary airways of mice repeatedly exposed to endotoxin is dependent on ILCs, and not T or B cells. What type of ILCs mediate this metaplastic response, and how, are yet to be determined.

EFFECT OF TAU ON NEURODEGENERATION IN C. ELEGANS

Manasi Desai

Toxicology and Pharmacology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 96
Mentor(s): Jamie Alan (PHARMACOLOGY & TOXICOLOGY)

Alzheimer's Disease (AD) is a disorder associated with memory loss and is characterized by the presence of tau tangles. Tau is a protein that binds and stabilizes microtubules and promotes axonal transport in healthy cells. However, when it becomes phosphorylated (p-tau), it aggregates with other tau proteins, resulting in neurodegeneration. AD is also characterized by a loss of acetylcholine (ACh), a neurotransmitter important in encoding new memories. To understand the role of phosphorylated tau in reduced ACh function, we will use the model organism C. elegans. This model organism has a short lifespan and is optically clear, allowing us to observe changes in the cholinergic neurons over the course of aging. We will compare the lifespan of C. elegans expressing GFP in their cholinergic neurons in worms expressing tau and p-tau. We will also assess healthspan by assessing cholinergic neurons

function by assessing motor movement (thrashing). Finally, we will monitor cholinergic neuron structure and integrity over time. We found a decrease in the average number of neurons in the worms expressing tau, suggesting that tau is an important part of cholinergic dysfunction. Future work will entail monitoring worms expressing p-tau, and we hypothesize that cholinergic neurodegeneration will occur more rapidly in them.

INHIBITION OF HDACS AND CHANGES IN CEREBROVASCULAR ANGIOGENESIS FOLLOWING BILATERAL CAROTID ARTERY STENOSIS IN FEMALE RATS

Arielle Buckley

Toxicology and Pharmacology, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 97
Mentor(s): Anne Dorrance (PHARMACOLOGY & TOXICOLOGY), Theresa Lansdell (PHARMACOLOGY & TOXICOLOGY)

Atherosclerosis can cause cerebral hypoperfusion which is associated with vascular cognitive impairment. To understand how cognitive decline develops in these patients animal models that mimic hypoperfusion have been developed. These models rely on a mechanical reduction in cerebral blood flow because rats do not develop atherlosclerotic plaques. One model of cerebral hypoperfusion is bilateral carotid artery stenosis (BCAS) in rats. Rats that undergo BCAS have increased angiogenesis to compensate for the loss of cerebral perfusion. We found that histone deacetylase (HDAC9) gene expression increases in female rats following BCAS surgery. Novel object recognition experiments in BCAS rats indicate decreased nonspatial memory (p=0.0351, n=6). Treatment of BCAS rats with an HDAC inhibitor, divalproex sodium valproate (VPA), improved non-spatial memory (p=0.0137, n=6) We hypothesized that VPA would protect against hypoperfusion and decrease angiogenesis in female rats following BCAS. Isolectin staining was used to quantify vascular endothelium in the cortex above the anterior hippocampal region. While not significant, preliminary data showed a trend towards increased angiogenesis in the cortex of BCAS rats (p=0.547, n=4). Data indicated a trend towards a decrease in angiogenesis in the cortex of BCAS/VPA rats compared to BCAS/vehicle (p=0.4071, n=4). Currently, the study is under powered (n=4). We expect significant findings once the study is sufficiently powered. This study lays the foundation for future work that will examine the role of HDACs in vascular cognitive impairment.

DEVELOPING NRF2 KNOCKOUT MICE FOR STUDYING LUNG CANCER

Michelle Zydeck

Toxicology and Pharmacology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 259
Mentor(s): Karen Liby (PHARMACOLOGY & TOXICOLOGY)

Lung cancer is the leading cause of cancer deaths in both men and women. The lung is continuously exposed to chemicals and carcinogens that cause oxidative stress. Therefore, lung cells must activate mechanisms to protect themselves. The Nrf2 pathway increases the expression of cytoprotective proteins that eliminate oxidative stress. Elevated Nrf2 levels, a consequence of mutations in the Nrf2 gene (NFE2L2)or its negative regulator Keap1, have been identified in 30% of lung cancers, leading to tumor progression and resistance to chemotherapeutic drugs. To study Nrf2 in lung cancer, we developed Nrf2 knockout (KO) mice.Mice were generated by electroporation of CRISPR-Cas9 RNP into A/J mouse zygotes. A founder with a null indel was identified and transmitted the allele to F1 offspring. The null allele harbored a 16bp deletion in exon 4 resulting in a frameshift after amino acid A137. For functional validation, Nrf2 wildtype (WT) and KO mice were gavaged with a vehicle control or Nrf2 activator, CDDO-IM. Six hours after treatment, liver, lungs, and kidney were collected and

the RNA was isolated. qPCR was used to measure the induction of the Nrf2 target genes NQO1, AKR1B8, and HMOX1,after normalizing to the housekeeping gene GAPDH. Preliminary findings showed upregulation of HMOX1and NQO1mRNA in Nrf2 WT mice but not in Nrf2 KO mice. Once validated, the Nrf2 KO mice will be used to determine the effects of pharmacological activators and inhibitors of the Nrf2 pathway on immune cells and the growth of lung tumors.

OCCUPATIONAL DUST EXPOSURE TO LIVESTOCK DERIVED PM2.5 MODULATES ALLERGIC INFLAMMATORY RESPONSES IN MICE

Ashleigh Tindle
Toxicology and Pharmacology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 260
Mentor(s): James Wagner (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION)

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 risk for adverse health effects associated with PM exposure. We tested the hypothesis that exacerbation of allergic airway responses by inhaled livestock farm particles is dose-and-source-dependent. We compared PM2.5 collected from chicken, pig, and goat farms in the Netherlands. Female BALB/c mice were sensitized and boosted with ovalbumin (OVA; days 0, 10, respectively), and then challenged with intranasal 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 bronchoalveolar lavage fluid (BALF) was collected for cell analysis and lung tissues were processed for light microscopy to analyze eosinophil density and intraepithelial mucosubstances (IM). OVA sensitization and challenge induced allergic airway inflammation, indicated by accumulation of eosinophils in BALF and lung tissues, and increased IM in conducting airways. PM2.5 alone had no adverse effects in non-allergic mice, but increased BALF and tissue eosinophils in allergic mice (goat >>pig >chicken PM). Chicken farm-derived particles dose dependently enhanced IgE (chicken>>goat>pig), while particles from goat farms were most potent to enhance OVA-induced IM. Microbiome analysis of PM samples revealed distinct bacterial and fungal signatures across livestock sources. Our results suggest that modulation of allergic airway inflammatory responses by livestock-farm associated-PM2.5 may be related to airborne biogenic components unique to each farm.

DOCOSAHEXAENOIC ACID IMPEDES INTERFERON GENE EXPRESSION IN SILICA-INDUCED LUPUS FLARING

Alexa Richardson
Toxicology and Pharmacology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 261
Mentor(s): James Pestka (FOOD SCIENCE & HUMAN NUTRITION), Kate Wierenga (FOOD SCIENCE & HUMAN NUTRITION), Preeti Chauhan (FOOD SCIENCE & HUMAN NUTRITION)

Systemic lupus erythematosus (SLE) is a chronic autoimmune disease that primarily impacts women of childbearing age and non-Caucasian descent. A hallmark of SLE is the production of autoantibodies, which form immune complexes with their cognate host antigens. DNA-containing immune complexes induce IFN expression, chemokine/cytokine release, systemic inflammation, and organ damage. IFN signature gene expression is significantly correlated with autoantibody profiles in patients with active SLE. Investigations using lupus-prone mice show that flaring is exacerbated by airway exposure to crystalline silica (cSiO2). Prior studies have also shown that autoimmune pathogenesis is limited by dietary supplementation with w-3 polyunsaturated fatty acid docosahexaenoic acid (DHA). This study tests the hypothesis

that DHA consumption interferes with upregulation of genes associated with cSiO2-triggered murine lupus. Animals were fed a control diet, a DHA low diet, or a DHA high diet (calorically equivalent to human consumption of 0, 2, or 5 g/day, respectively) and exposed to vehicle or 1 mg cSiO2 once per week for four weeks. The NanoString nCounter was used to measure gene expression in the lungs of female NZBWF1 mice at 1, 5, 9, and 13 weeks following the final cSiO2 instillation. Most prominent was the impact of DHA on IFN response genes (IRGs). Both DHA diets suppressed IRG expression at 1 and 5 weeks post installation (PI), while the protective effects of DHA high diet were observed as late as 9 weeks PI. Taken together, these findings suggest that DHA supplementation is protective against cSiO2-triggered IRG expression in lupus prone mice.

EFFECTS OF AMBIENT AIR POLLUTION ON LUNG TUMORS: DO ORGANIC CHEMICALS IN PARTICULATE MATTER 2.5 (PM2.5) AND VAPOR PHASE POLLUTANTS INFLUENCE THE INDUCTION OR EXACERBATION OF LUNG TUMORS?

Jade Gmitter
Toxicology and Pharmacology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 262
Mentor(s): Ning Li (PATHOBIOLOGY & DIAGNOSTIC INVESTIGATION), Susan Ewart (LARGE ANIMAL CLINICAL SCIENCES)

Outdoor particulate matter (≤ 2.5 μm, PM2.5) is a major risk factor for lung cancer, one of the leading cancers worldwide with 2.1 million cases and 1.8 million deaths in 2018. While it is established that generation of cellular oxidative stress by redox-active organic chemicals is a major mechanism for the adverse health effects of PM2.5, little is known about the effects of coexisting vapor-phase organic pollutants (vapor). We hypothesized that PM2.5 and vapor would exert additive or synergistic effects in promoting the growth of non-small cell lung cancer (NSCLC), which accounts for 80% of all lung cancers, by inducing oxidative stress. Organic extracts of PM2.5 and vapor samples from five locations in California were prepared. Organic extracts of diesel exhaust (DE), a known carcinogen, was included for comparison. Dose-response and kinetic studies were performed by stimulating NSCLC cells with extracts of PM, vapor, PM+vapor or DE. Cell proliferation, oxidative stress and activation of pro-inflammatory cytokines were analyzed by cell counting kit-8 assay, western blot and enzyme-linked immunosorbent assay (ELISA), respectively. We demonstrate that cell proliferation and activation of pro-inflammatory cytokines are positively correlated to pro-oxidant potential of air pollutants and there's an additive or synergistic effect between PM2.5 and vapor. These results provide important insights into how "real-life" multi-pollutant environment contributes to lung carcinogenesis.

THE ROLE OF HDAC9 INHIBITION IN CEREBRAL HYPOPERFUSION ASSOCIATED COGNITIVE DECLINE AND INFLAMMATION

Martina Yen
Toxicology and Pharmacology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 263
Mentor(s): Anne Dorrance (PHARMACOLOGY & TOXICOLOGY), Theresa Lansdell (PHARMACOLOGY & TOXICOLOGY)

Vascular cognitive impairment and dementia (VCID) is the second most common type of dementia after Alzheimer's disease and is an important consequence of chronic cerebral hypoperfusion. Cerebral hypoperfusion is associated with impaired memory, decreased myelin intensity, and increased microglial activation in the area of myelin degradation. These changes are associated with the increased expression of the histone deacetylase 9 (HDAC9) gene, a key player in transcriptional regulation. We hypothesized that sodium valproate

(VPA), an HDAC9 inhibitor, protects against microglial activation in the cortex caused by cerebral hypoperfusion. In this study, 16 week old female Sprague Dawley rats were randomized into four treatment groups: sham-vehicle, sham-VPA, BCAS-vehicle, BCAS-VPA. To model cerebral hypoperfusion, rats underwent either a bilateral carotid artery stenosis (BCAS) or a sham surgery and were treated with either vehicle or VPA. Eight weeks following surgery a novel object recognition test was performed to assess non-spatial memory, and Iba1 immunohistochemistry was used to label and quantify microglia in the cortex and hippocampus. Novel object recognition indicated BCAS rats had impaired nonspatial memory (p=0.0351, n=6) and that VPA prevented memory impairment (p=0.0137, n=6). Preliminary data indicate a trend toward increased Iba1+ microglia in the cortex of BCAS rats compared to sham (p=0.0520 n=4), and treatment with VPA did not change the number of Iba1+ cells (p= 0.8531, n=4). These results suggest prevention of microglial associated inflammation is not important for maintenance of non-spatial memory following BCAS.

DEVELOPMENT OF FAIRTOX, A DATABASE APPLICATION TO PROMOTE DATA ACCESSIBILITY AT THE MSU SUPERFUND RESEARCH CENTER AND BEYOND.

Hattie Pimentel

Toxicology and Pharmacology, Poster Presentation
Section: 2, 11:00 - 12:30 PM
Presentation Number: 264
Mentor(s): Rance Nault (BIOCHEMISTRY & MOLECULAR BIOLOGY), Timothy Zacharewski (BIOCHEMISTRY & MOLECULAR BIOLOGY)

The Michigan State University (MSU) Superfund Research Center (SRC) and similar research institutions produce vast amounts of toxicology data. To maximize the use of this data to further elucidate the mechanisms of toxicity and support human risk assessment, this data must be Findable, Accessible, Interoperable, and Reusable (FAIR). A challenge to making data FAIR compliant is the standardized collection of data and relevant metadata. The FAIRtox database application provides an intuitive framework for collecting and sharing toxicology data using controlled vocabulary and structured data input fields to ensure that the data is interoperable and reusable. The app allows users to input data points step-by-step into an aggregated toxicology SQL database without directly interacting with database. Adherence to the database schema is enforced through regular expression text matching and limited user input choices. The sequence of input fields maintains foreign key constraints. The app provides users graphical summaries of data inputs and database statistics, facilitating data quality control and supporting initial data interpretation and hypothesis testing. It will be hosted on an MSU SRC server in a Docker container to ensure portability and version control, and will be shared with external institutions though code sharing platforms. R Shiny was used to maximize user interactivity and employ pre-built R packages for analysis of biomedical data. SQLite (and eventually SQL) is used for data querying and storage. The goal of the FAIRtox database application is to facilitate research on aggregated toxicology data from independent investigators and institutions. Superfund Research Program Grant NIEHS P42ES04911.

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: 3, 1:00 - 2:30 PM
Presentation Number: 445
Mentor(s): James Pestka (FOOD SCIENCE & HUMAN NUTRITION), Kate Wierenga (FOOD SCIENCE & HUMAN NUTRITION), Madduma Hettige Lichchavi Rajasinghe (FOOD SCIENCE & HUMAN NUTRITION)

Inhalation of the environmental toxicant crystalline silica (cSiO2) induces inflammation in the lungs. Phagocytosis of cSiO2 by alveolar macrophages can facilitate clearance of the particle, but it also causes cell death, which can contribute to inflammatory response. It has previously been shown that feeding mice the omega-3 polyunsaturated fatty acid DHA can cSiO2-triggered inflammation. DHA may accomplish this by preventing cell death in the macrophage. The objectives of this study are to 1) understand effects of cSiO2 on macrophages in vitro and 2) determine how these responses are impacted by DHA. We used multiple assays to assess cSiO2-induced cell death in three cultured macrophage cell lines: ASC-transfected RAW 264.7 cells, Max Plank Institute (MPI) cells, and ex vivo alveolar macrophages. Cells were treated for 20 hr with DHA or Veh, followed by 6 hr cSiO2 exposure. Cell viability was determined by 1) MTS assay to quantify intracellular mitochondrial activity, 2) LDH assay to assess membrane integrity, and 3) cell staining with Propidium Iodide and Hoechst to visualize the dead and live cells. Each cell line appeared to be equally effected by cSiO2, regardless of the assay employed. Specifically, cSiO2 exposure decreased cell viability (MTS) and induced cell death (LDH, staining) in a dose dependent manner. DHA incubation appeared to be slightly protective against cSiO2 induced death. In conclusion, our results suggest that DHA may have a minor protective effect against cSiO2-induced cell death, but likely protects against inflammation through additional mechanisms.

INVESTIGATING THE EFFECTS OF PREX2 TRUNCATING MUTATIONS ON MELANOMA DRUG RESISTIVITY

Danny Mitchell
Toxicology and Pharmacology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 446
Mentor(s): Richard Neubig (PHARMACOLOGY & TOXICOLOGY)

PREX2 (phosphatidylinositol-3, 4, 5-triphosphate-dependent Rac exchange factor 2) is a Rac1 guanine nucleotide exchange factor (GEF) that activates Rac1 through the exchange of GDP for GTP. A primary function of Rac1 is to modulate the actin cytoskeleton which results in the modulation of multiple cellular phenotypes including proliferation, migration, and apoptosis. Previous studies have identified recurrent Rac1P29S/L mutations in human melanoma tumors and found that these mutations promote drug resistance in melanoma cells. Based upon these findings, we hypothesized that PREX2 mutations may also promote drug resistance. We first cloned PREX2 into a gateway compatible donor vector, and then used site directed mutagenesis to engineer truncating PREX2 mutations which were discovered in patient samples. We predict that these PREX2 mutations activate PREX2 since they result in deletion of the C-terminal regulatory domain, leaving the N-terminal GEF domain unaltered. The goal of this study is to test whether these truncating mutations promote BRAF inhibitor resistance in melanoma. By characterizing the role of these mutations in drug resistance, we hope to develop new therapeutic strategies to prevent or reverse drug resistance, or predict whether a tumor will be resistant to BRAF inhibitors altogether.

EVALUATING MOTOR MOVEMENT DISORDERS IN GNAO1 MUTANT MICE WITH THE BALANCE BEAM TEST

Will Grace
Toxicology and Pharmacology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 447
Mentor(s): Jeffrey Leipprandt (PHARMACOLOGY & TOXICOLOGY), Richard Neubig (PHARMACOLOGY & TOXICOLOGY)

The Balance beam test is a precise way to measure motor deficiencies in rodents, whether these deficiencies be balance, coordination, or fine motor function. The basic setup of the

apparatus involves a beam (a wooden dowel or rectangular beam), suspended over a net to catch a rodent if it falls. On the end of the beam is a black box with cage bedding inside, to create a welcoming environment to attract the mice. The middle 80 centimeters are marked on each beam- a start point and an endpoint. The measured data is the time it takes for the mouse to traverse the beam, start point to endpoint. The mice are trained on the initial day, to get acclimatized to the beam and learn to traverse it, then are tested 3 times on test day. This test has proven useful in determining motor deficits in GNAO1 mutant mice. The GNAO1 gene encodes for the G-protein G, subunit alpha. Mutations in this gene present themselves through neurological disorders, such as NEDIM, or Neurodevelopmental Disorder with Involuntary movements. The hypothesis is that mice with knock-in mutations to the GNAO1 gene will display greater difficulty with the balance beam test, take longer, slip more, etc. (Loss of function), compared to control mice. Additionally, mice with knock-in GNAO1 mutations may display hyperlocomotion, or cross the beam faster (Gain of function) compared to control mice. Further establishing the link between these mutations and NEDIM is crucial as the disorder may become more prevalent.

BEHAVIORAL AND IMMUNOHISTOCHEMICAL ANALYSIS OF GNAO1 MUTANT MOUSE MODELS

Alex Roy

Toxicology and Pharmacology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 448
Mentor(s): Erika Lisabeth (PHARMACOLOGY & TOXICOLOGY), Jeffrey Leipprandt (PHARMACOLOGY & TOXICOLOGY), Richard Neubig (PHARMACOLOGY & TOXICOLOGY)

GNAO1 codes for the alpha subunit of the G-protein Go, which accounts for roughly 1% of membrane proteins in mammalian brains. Mutations in the gene GNAO1 have been associated with movement disorders and epileptic phenotypes. The primary goals of my project have been to continue work on our mouse models of these mutations, further characterizing the symptoms they display and investigating their mechanistic causes. By performing milestones testing on young mouse pups, I have shown that two of our mouse models, G203R and R209H, do not display the neurodevelopmental delay found in patients. To find treatments targeting this phenotype, a different way to model it must be found. My current experiments focus on the effects of G-alpha mutations on the proper development of the cerebellar cortex, which is key for motor coordination. I will perform immunohistochemical staining on cerebellar brain sections of mature (8-12 week old) GNAO1 mutant mice to investigate two major factors: (1) defects in gross morphology and (2) inhibitory neuron structure to investigate the cause of abnormal electrical signaling observed by others in our group. I expect to find lowered counts and/or density of inhibitory neurons and GABAergic axon terminals. This project will further our mechanistic framework underlying mutations in GNAO1 which represent a huge burden to patients and their families.

EXPOSURE TO CADMIUM INHIBITS IL-2 PRODUCTION BY ACTIVATED T CELLS FROM RATS

Maria Poidomani

Toxicology and Pharmacology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 449
Mentor(s): Cheryl Rockwell (PHARMACOLOGY & TOXICOLOGY), Elahe Crockett-Torabi (MEDICINE), Rebekah Kennedy (PHARMACOLOGY & TOXICOLOGY)

Cadmium is a heavy metal and environmental contaminant, where exposure occurs through a variety of routes. Chronic exposure to cadmium can induce long-term immunotoxic damage to vital organs, including the spleen. Specifically, cadmium can cause splenomegaly, oxidative

stress and other effects on the adaptive immune system. The mechanism for many of these effects remains unknown. The purpose of the present study was to assess the effect of chronic high dose cadmium exposure on immune parameters in female rats (as may occur in an occupational setting). Female rats were provided 0.6 mg/kg/day cadmium by s.c. administration for twelve weeks, after which spleens were collected and weighed. We observed splenomegaly and a marked increase in splenocyte numbers in cadmium-treated rats as compared to control rats. We also observed a substantial decrease in IL-2 production in splenocytes activated with anti-CD3/anti-CD28 in vitro. Overall, these data indicate that chronic exposure to cadmium at this dose increases immune cellularity and inhibits IL-2 production by activated T cells. These findings suggest that high-dose cadmium alters immune homeostasis which may disrupt immune function. This work was supported by NIH grants R01 ES024966 (to C.E.R.), R15 ES028443 (to J.R.E.) and 5-R25-HL108864 (to E.T.C.).

SAFETY AND EFFICACY OF TOPICALLY ADMINISTERED NETARSUDIL/LATANOPROST OPHTHALMIC SOLUTION (ROCKLATAN) IN NORMAL AND GLAUCOMATOUS DOGS

Kelly Leary

Toxicology and Pharmacology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 450
Mentor(s): Andras Komaromy (SMALL ANIMAL CLINICAL SCIENCES)

Netarsudil is a recently approved Rho kinase inhibitor for lowering intraocular pressure (IOP) in human patients with glaucoma. We have previosuly shown in normal and glaucomatous dogs with ADAMTS10-open-angle glaucoma (ADAMTS10-OAG) that topically administered netarsudil 0.02% ophthalmic solution (Rhopressa™ Aerie Pharmaceutical) only has a marginal and clinically irrelevant effect on IOP. The purpose of the current study was to evaluate safety and efficacy of topically administered netarsudil/latanoprost 0.02%/0.005% ophthalmic solution combination (Rocklatan™; Aerie Pharmaceutical) compared to latanoprost 0.005%. Five normal and 5 dogs with ADAMTS10-OAG were enrolled. Once (q24h) and twice daily (q12h) treatments were evaluated. Differences in least square means of diurnal IOPs were compared between netarsudil/latanoprost- vs. latanoprost-treated eyes by linear Gaussian model. Safety was assessed by routine ophthalmic examination, gonioscopy and pachymetry. Baseline IOPs were 13.8 ± 0.7 mmHg (mean ± SEM) in normal and 28.4 ± 1.4 mmHg in OAG dogs. IOP decreased significantly in both netarsudil/latanoprost- vs. latanoprost-treated eyes ($p<0.05$), but there was no significant difference between treatments (q24hnormal: 11.7 ± 0.7 mmHg vs. 11.6 ± 0.7 mmHg q24hr-OAG: 14.2 ± 1.3 mmHg vs. 13.6 ± 1.2 mmHg vs. treatment; q12hr-normal: 9.7 ±0.9 mmHg vs. 9.5 ± 0.9 mmHg; q12hr-OAG: 10.7 ±1.4 mmHg vs. 10.7 ±1.3 mmHg), indicating no added treatment effect by netarsudil. The netarsudil/latanoprost was well tolerated but resulted in significant, moderate to severe conjunctival hyperemia ($p<0.001$).

EXPLORING THE PHYSIOLOGICAL ROLES OF UNSATURATED FATTY ACIDS USING C. ELEGANS

Benjamin Kessler

Toxicology and Pharmacology, Poster Presentation
Section: 3, 1:00 - 2:30 PM
Presentation Number: 451
Mentor(s): Jamie Alan (PHARMACOLOGY & TOXICOLOGY), Kin Sing Lee (PHARMACOLOGY & TOXICOLOGY)

Monounsaturated fatty acids (MUFAs) and polyunsaturated fatty acids (PUFAs) play a crucial role in a diet, but it is unclear which specific unsaturated fatty acids are required and what the physiological consequences of having different amounts of these molecules and their metabolites in the body are. Specific omega-3 and omega-6 PUFAs have been shown to be

beneficial to human diseases, such as cardiovascular disease, inflammatory conditions, and certain cognitive impairments. This study aims to investigate the physiological roles of individual MUFAs and PUFAs. From this study, we will gain the preliminary knowledge for making dietary and treatment suggestions for patients with various disease states and in normal aging. We will use the model organism C. elegans because of its short lifespan, abundance of available genetic tools, and reliable translation to human disease. Preliminary data suggests that specific MUFAs and PUFAs are essential for normal lifespan, physiological functions, and neurodevelopment. This study will expand on this by examining every available genetic knockout of fatty acid desaturase enzyme in the worm. We will conduct lifespan assays in order to observe changes in the median and maximum lifespans of different genetic knockouts compared to the wild type as well as thrashing assays, a measure of physical fitness. We hypothesize that certain unsaturated fatty acids play more important physiologic roles than others and the corresponding downstream metabolites are important lipid signaling molecules. Preliminary results from the lab confirm these hypotheses, as the genetic strains tested thus far show variations in lifespan and fitness.

VISUAL & PERFORMING ARTS

INFLUENCES ON TEMPO DETERMINATION

Adam Huston, Dominic Occhietti, Eric Saroian, Nathalie Nordan
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 25
Mentor(s): Leigh VanHandel (MUSIC)

Tempo determination is the process of actively determining an appropriate tempo based on melodic, rhythmic, or harmonic cues.This project investigates the role of rhythm in the tempo determination process, with the hypothesis that given the ability to alter the tempo, a subject will decrease the tempo for rhythmic stimuli perceived as more complex and increase the tempo for rhythmic stimuli perceived as less complex. The rhythmic stimuli and rating scales are drawn in part from the work of Povel and Essens (1985) and Essens (1995), as well as related studies (Boltz 1998; Fitch and Rosenfeld 2007; Thul and Toussaint 2008; Shmulevich and Povel 2010; Hoesl and Senn 2018). The experimental design consists of three sections. In the first, participants use a spin wheel to adjust the tempo of rhythmic stimuli in real time until it feels "correct." The second section presents the same task, but the rhythmic stimuli are preceded by a metrical defining context (four quarter notes). The third section presents participants with the metric context and the rhythmic stimuli, asking the participants to rate the complexity of the rhythms on a scale of 1-6 (very simple - very complex). Preliminary results confirm the initial hypothesis. Ratings of syncopation and density for the rhythmic stimuli are correlated with rated complexity, and appear to have an effect on the determination of tempo, with increased syncopation and density resulting in slower tempos. Follow-up experiments will study how syncopation and density influence complexity ratings and tempo determination.

IMPLEMENTING TECHNOLOGY TO ENGAGE AUDIENCES AND PERFORMERS.

Daniel Isabella
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 26
Mentor(s): Alison Dobbins (THEATRE)

The Theatre Engine project explores ways to create a stronger connection between the audience and the performer by combining technology and live performance to create a fully

immersive and interactive experience. The specific project under study, Science: The Musical, incorporates improv and musical theatre. The associated web application for Science: The Musical, accessible on smartphones and tablets, allows the audience to make physical and emotional choices that affect the story and performers. These choices range from altering the lighting on stage to shifting tone and tempo in music and deciding the performers' progression through the narrative. Throughout the production of Science: the Musical the connection between performer and audience will be measured qualitatively through: participation in activities, general volume, and post-performance surveys. Theatre Engine strives to harbor mutual understanding between the artist and spectators.

ALLEVIATING THE FEARS OF DIRECT AUDIENCE PARTICIPATION IN A PERFORMANCE

Mark Zummallen

Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 27
Mentor(s): Alison Dobbins (THEATRE)

The goal of the research is to determine the possibilities of increasing the connection between performer and performance through an improv or narrative story. The performance being studied is a long-form improv which incorporates technological and physical games to increase audience/actor cooperation. Through these two mediums, technology and improvisation, the audience will be less frightened of direct interaction with the show and act more cooperatively with its actors. Qualitative measurements of audio and visual cues such as length and volume of laughter, facial expression, and body language will be taken in an attempt to measure the effective audience engagement. These parameters will be used to determine the level of cooperation and contribution of the audience at each performance. Surveys will also be used to gather individual and self-reflective data from attendees indicating the extent of each activity in achieving the desired effect. While this performance is still in developmental phases and has yet to be tested, trial and error has provided a clear direction for the growth of this research. This performance will articulate methods for creating a space in which the audience can be incorporated creatively and comfortably as they personally interact with each performer.

HONKY TONK LAUNDRY: THE INTERMINGLING OF ARTISTRY AND TECHNOLOGY AT STAGES REPERTORY THEATRE

Michael Gault

Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 28
Mentor(s): Kirk Domer (THEATRE)

For Honky Tonk Laundry by Roger Bean, Michael Gault served as the assistant scenicdesigner to Professor Kirk Domer. In residence for nine days during the tech/dress process at Stages Repertory Theatre in Houston, TX, Mr. Gault served as a resident designer working alongside industry professionals at the brand-new Rochelle and Max Levit Stage at The Gordy. He explored narratives told for the stage that reflect the human condition and spark an emotional response in audiences. As a theatrical designer, he embraced the reoccurring themes to elevate the script, heightening the impact the production can have on viewers. To accomplish this result, he performed extensive research on the subject material and its context through script analysis. Serving as a design assistant, Mr. Gault helped coordinate these requirements, restraints, and creative freedoms that weaved together into the final design of the show. As a jukebox musical, Honky Tonk Laundry explores two characters coming together to look past the failing laundromat and cheating boyfriends so they can embrace their independence in a Honky Tonk country musical. The final design

communicated the story in a visual medium where the script alone cannot. Mr. Gault assisted in inventing a world where emotions and narrative combined to alter and enhance an audience member's perspective on women and relationships.

THE INTERMINGLING OF ARTISTRY AND TECHNOLOGY AT A.D. PLAYERS AND KICKSHAW THEATRE

Joseph Lancour
Visual and Performing Arts, Poster Presentation
Section: 1, 9:00 - 10:30 AM
Presentation Number: 29
Mentor(s): Kirk Domer (THEATRE)

For Guess Who's Coming to Dinner by Todd Kreidler at A.D. Players and Lungs by Duncan Macmillan at Kickshaw Theatre, Joseph Lancour served as the assistant scenic designer to Kirk Domer on two different creative activity projects. In residence for seven days during the tech/dress process until opening at A.D. Players at The George Theatre in Houston, TX, Mr. Lancour served as a resident designer to work alongside industry professionals to complete an exquisite mid-century interior that received rave reviews from several Houston news outlets. Additionally, for two months in early 2020, Mr. Lancour assisted with the scene design and implementation for Lungs at Kickshaw Theatre in Ann Arbor, MI. This project had a new layer of complication as this production was mounted in a non-conventional and site-specific space: trustArt Studios. As a principal member of the Lungs production team, he worked with Michigan professionals to design several parts of the set, specifically the engineering of central fabric panels. Coordinating the load-in and realization of the design before tech week, Mr. Lancour also served as a theatrical technician at Kickshaw Theatre, exploring traditional scenic technologies used in modern theatrical practices.

HOW DOES DESIGN MAKE MEANING FOR US?

Roberto Xu
Visual and Performing Arts, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 381
Mentor(s): Rebecca Cifaldi (ART, ART HISTORY, AND DESIGN)

When making discussion about the message of a "design," people often describes it as abstract, creative and hard to understand, but the truth is that the message behind a "design" is realistic, relative to people, and is a product of culture. This research is about learning the different feelings and thoughts that people have when they look at various designs and the reasons for it. Moreover, finding graphic design's (visual language) function in society. The research will also be comparing the different results that people have for the same design for each design set. This research is important because the answers that each individual answer reflects to their background and experiences. This will demonstrate how design is correlated to our everyday life. The research is conducted by creating 10 slides with different images containing the same word set in same typeface, and other 10 slides with same image but containing different words set in same typeface. Four people are being asked to describe their feelings and thoughts about all the 20 slides. From the discussion with the four individuals, I will be able to present how design is involved and being influenced by culture.

A PORTRAIT OF THE MODERN ACTOR: THE VICTORIAN ERA'S INFLUENCE ON THE PROFESSION OF ACTING

Abigail Byrne
Visual and Performing Arts, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 382

Mentor(s): Ryan Welsh (THEATRE)

At the turn of the century, the fall of resident and stock companies transformed the profession of acting. This presentation compares the Victorian era's concept of the profession to that of the modern actor. With an emphasis on the question of what should a great actor be? I explore the value of liberal arts education and entrepreneurship for actors from 20th century through the present.

SELF-REPORTED VOICE USE IN STUDENT SINGERS: DOES THE METHOD OF REPORTING MATTER?

Alyssa Fritz, Grace Kuza
Visual and Performing Arts, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 383
Mentor(s): Jeffrey Searl (COMMUNICATIVE SCIENCES AND DISORDERS)

Singers have more voice problems than non-singers because they use their voice a lot and in demanding ways. When singers are evaluated for a voice problem, they are asked to report voice history information that is generally considered a core part of the diagnostic process. What is not known is whether the method by which voice history information is gathered influences what a singer reports. The purpose of this study was to evaluate whether student singers differ in reporting voice use information when completing a one-time history form verses completing a daily log of the same items filled out over three weeks. The history form mimics what happens in voice diagnostics today and requires reflection and recall at a single moment in time on items that they may not have attended to previously. The voice log forces more regular reflection and reporting. Twenty-seven student-singers completed a voice history form first, and then completed a 21-day voice log to record information on the same parameters included in the one-time history form. Nonparametric procedures were used to compare data from the history form to the median values for each item calculated from the 21-day log. Results indicated that, in fact, some voice use parameters do differ based on the method by which the history information was gathered. Future studies are needed to determine whether one of the history gathering methods is more accurate than the other so that clinical procedures can be refined.

TO BE CONTINUED

Zaria Cannon
Visual and Performing Arts, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 384
Mentor(s): Ryan Claytor (ART, ART HISTORY, AND DESIGN)

In my presentation, I will talk about how my experience in working as Professor Ryan Claytor's flatting partner will help me in my future careers. I will go into detail on what I learned, and what I plan on doing with it, and how I have grown as an artist and a student because of it. My poster will be a self-reflection on myself about my experience with being his intern. I will also explain the concept of flatting. what it is, what it's for, how to do it, etc. The research is important, because it is important to do self-reflections on ourselves often. To see how you have grown as a person from the experiences you've faced.

USING TECHNOLOGY TO AID IN PRE-PRODUCTION DIRECTING/CHOREOGRAPHY

Christopher Kaifesh
Visual and Performing Arts, Poster Presentation
Section: 2, 1:00 - 2:30 PM
Presentation Number: 385
Mentor(s): Alisa Hauser (THEATRE)

Theatre methods in directing and choreography are constantly changing, due to advancements in technology and software. As the assistant director and choreographer for Summer Circle Theatre's production of the musical revue Showtune, my research focuses on how technology will aid in pre-production directing and choreography. In preparation for this summer's rehearsals and performances, I plan to explore how access to information over the past sixty years is completely different, and how it has aided in overall accessibility to conducting initial directional research through certain software programs. By using software like StageWrite, I will investigate how electronically staging and choreographing benefits users while creating movement patterns and spacing charts. With the aid of technology, directing and choreographing is virtually accessible across the globe, allowing for reference and pre-production collaboration by digitally sharing stage plans. My research seeks to identify the most practical technological techniques to staging and choreographing and focuses on exploring the accessibility of the internet for directorial research.

ACCESSIBILITY TO BROADWAY

Laura Catron
Visual and Performing Arts, Oral Presentation
Section: 3, 11:00 AM
Presentation Number: 917
Mentor(s): Laura MacDonald (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

The entire purpose of Broadway shows are to be seen and experienced by an audience, but accessibility to this art form is plagued by limitations in affordability and location. In its current state, only about one quarter of Broadway shows turn a profit; the rest fail to break even. Beyond basic concerns of capital, however, accessibility is vital in expanding Broadway's audience as well as in spreading the immaterial dividends that come with experiencing diverse storytelling forms. Art is not meant to rest solely in the hands of the elite. The characters of Broadway shows, from hard-working waitresses to young, scrappy, and hungry immigrants, often represent the common people. But the common people cannot experience this art. My research explores the modern accessibility difficulties experienced by world-wide, age-diverse, self-described Broadway fans, from those who live in remote areas without access to theatre as well as those that cannot afford the price of a ticket. Their approaches to experiencing the medium of theatre vary from the controversial practice of bootlegging professional shows, to creating their own content surrounding these musicals, to solely engaging with official installments of the production like movie musicals and cast recordings. Within my presentation I investigate ways to expand accessibility to Broadway in ways that fairly balance the hard work of the creators and actors with the audiences' overwhelming desire to engage with Broadway content.

BIG BREAKAWAY - EPISODE 1 "DISCOVERY"

Josh Troemel
Visual and Performing Arts, Oral Presentation
Section: 3, 11:15 AM
Presentation Number: 918
Mentor(s): Amol Pavangadkar (MEDIA AND INFORMATION), Brian Kusch (COMMUNICATION ARTS AND SCIENCES)

Fall 2019 MI 442 Capstone Video Project

UNCOVERING THE CREATIVE COMMUNITY OF THE GREATER LANSING AREA

Lexi Nadolsky, Mckenna Adams, Samir Rajani
Visual and Performing Arts, Oral Presentation
Section: 3, 11:30 AM
Presentation Number: 919

Mentor(s): Melissa Charenko (LYMAN BRIGGS COLLEGE)

We are developing a public website to introduce different forms of art in the greater Lansing-area in order to uncover the arts' impact on the surrounding communities. Our project will help to explain the significance of art in the community and generate a larger interest in the arts. Additionally, this research will spread awareness of the artistic culture in the Greater Lansing Area, and thus facilitate enhanced access to the art pieces and their creators. Art reflects the status and the overall atmosphere of the communities the works are presented in. It is important to analyze these works as they accurately reflect the conditions of the location, time period, and members of the community. As a whole, this website aims to inform the public about what's present in the surrounding community. Creating a website that combines multiple areas of the arts into one overarching tour will help draw more interest into the local art community. People will be informed where to find certain visual experiences, and local artists will be able to receive recognition for their work. The principal methods of research in this project were mainly investigative field work such as conducting interviews, reviewing primary sources related to specific institutions and pieces, and visiting impactful structures in person. Primary source documents as well as other electronic resources were used.

PARTICIPATION IN THE ARTS AND PERCEPTION OF CREATIVE COMPETENCE

Dante Billeci
Visual and Performing Arts, Oral Presentation
Section: 3, 11:45 AM
Presentation Number: 920
Mentor(s): Joanna Bosse (RESIDENTIAL COLLEGE IN THE ARTS & HUMANITIES)

This study aims to understand the relationship between experience in the arts during one's upbringing and their participation in the arts in the present day. Our hypothesis is if study participants were told early in their life that they are not talented, which would result in a negative perception of creative competence, then they won't participate in creative acts such as music, dance, theatre, or visual art. Through an online survey and an optional interview, data will be gathered surrounding study participants' experiences in the arts, in terms of longevity, type (i.e music, dance, visual art, theatre, etc.), perceived talent, and creative shaming. With this data, we hope to identify the mechanisms in people's lives that prevent them from participating in the arts. If this hypothesis is true, the data can be used to demonstrate a need for art education reform. In addition, as people can medically benefit from participation in the arts, based on studies in art therapy (especially in terms of mental health), this study could demonstrate a need for an increased presence of arts programs in schools and communities.

IMPROVED ACCESS TO CHILDREN FROM LOW-INCOME FAMILIES TO FREE SUMMER CIRCLE KIDS CAMP

Christopher Kaifesh
Visual and Performing Arts, Oral Presentation
Section: 3, 12:00 PM
Presentation Number: 921
Mentor(s): Ann White (THEATRE)

Every year, the MSU Department of Theatre's Summer Circle Theatre is committed to provide free programming and activities in arts, education, and entertainment, including the free Summer Circle Theatre's Kids Camp. To provide improved access to Lansing-area children from low-income families, my research focuses on identifying the primary barriers to participation, as well as developing methods of recruitment, transportation as well as administrative and programming strategies to the SCT Kids Camp. By meeting with MSU Outreach and Engagement, reaching out to local elementary school guidance counselors and staff, my research seeks to identify children from low-income families to encourage and

support their involvement in SCT Kids Camp. This project redefines who theatre arts are for in the interest of developing theatre artists and theatregoers from diverse backgrounds.

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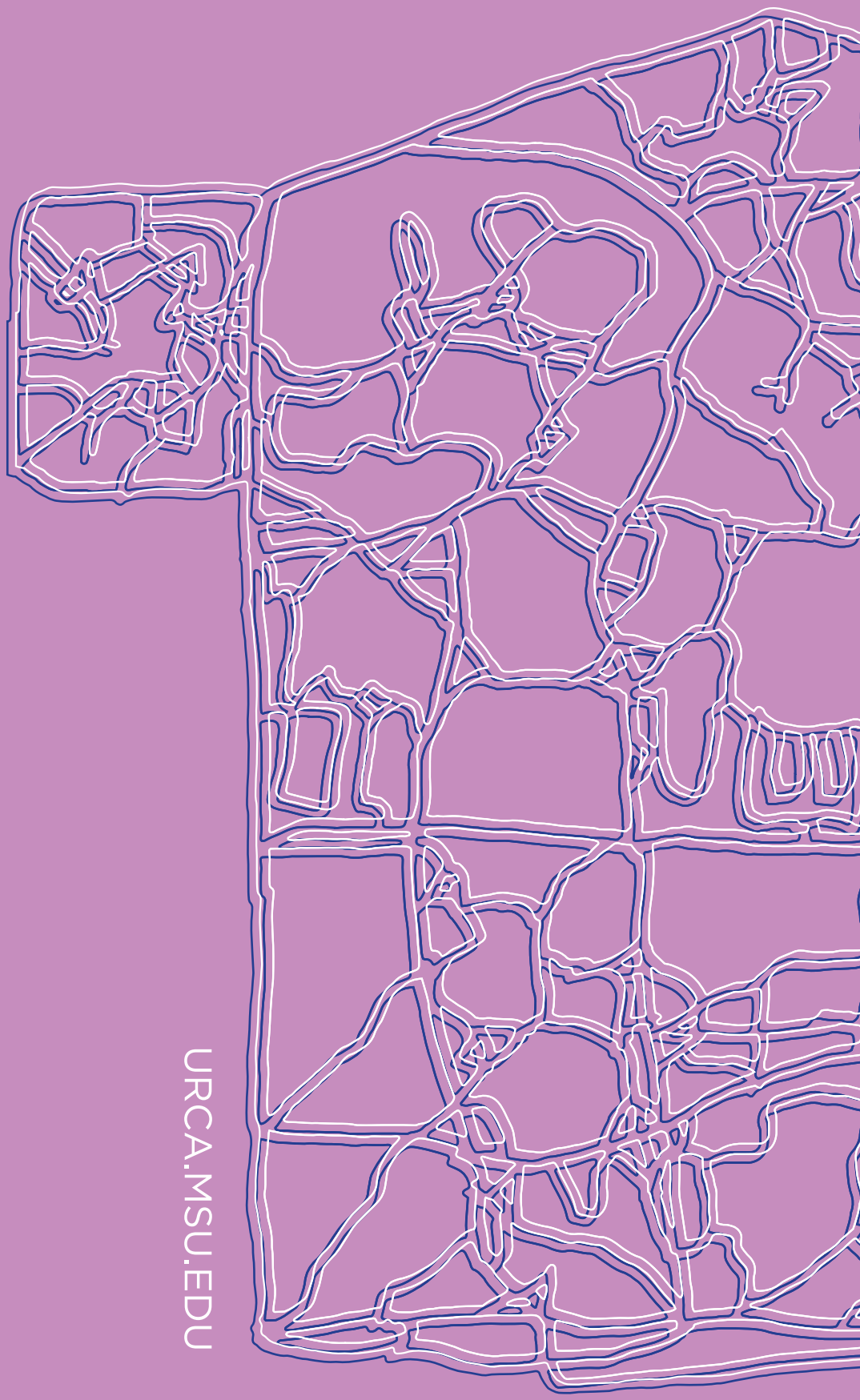

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